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PRESERVATION OF PHILIPPINE FOODS

A Manual of Principles and Procedures

Edited by Sonia Y. de Leon

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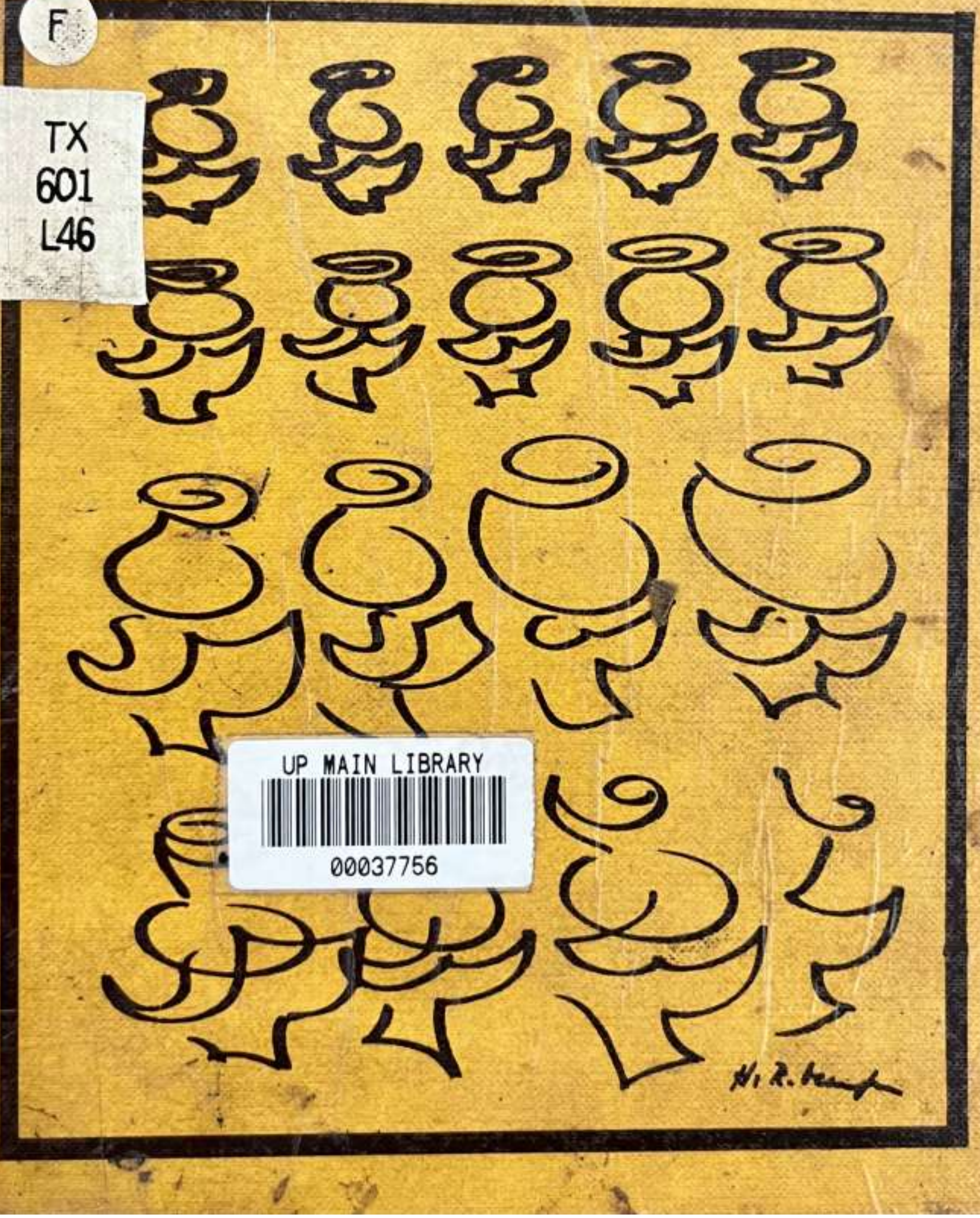

PRESERVATION OF PHILIPPINE FOODS
(A Manual of Principles and Procedures)

NOTE ON THE COVER MOTIF:

The cover motif representing a progression from the representational to abstract in drawing of the Philippine stove and pot (*palayok, kalan*) is by the famous Filipino painter Hernando R. Ocampo. The drawing illustrates, in terms of the artistic line, the principles of food preservation.

Preservation
of
Philippine Foods

A MANUAL OF PRINCIPLES AND PROCEDURES

COMPILED AND EDITED

BY

SONIA Y. DE LEON, Ph. D.

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PUBLISHERS
Quezon City, Philippines

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PREFACE

Food preservation could alleviate the ever growing problem of hunger and malnutrition in the Philippines. Salting, drying, smoking, curing, fermenting, canning, refrigerating and freezing could save large quantities of our food from spoilage to meet the nutritional requirements of our people.

The object of this manual is to encourage housewives and students to preserve foods at home. Maybe the array of appetizing preserves could entice some to try the recipes themselves. The methods suggested are all within the income and capacity of the average Filipino family. Also, the ingredients and equipment called for are commonly found at home. Each product can be made easily by following the step-by-step procedure; each recipe is garnished with useful tips for cooking, storing and serving. Here are the secrets of food preservation—presented in over a hundred tried and tested recipes.

The student will find the many features incorporated in the manual helpful learning and applying the principles of food preservation. The INTRODUCTION gives a bird's-eye view of the field: What fruits and vegetables can be preserved? How can meat and fish be preserved? What are the common methods of food preservation? What are the characteristics of spoilage agents? The SECTIONS following bring each method of food preservation into focus. In exploring each area, the student may be guided by the brief introductory note, the specific instructions and the concluding questions. A list of suggested activities and references opens avenues for the interested and the diligent student who wishes to delve deeper into the subject.

The teacher will find more joy in teaching food preservation because ideas are presented to help her "visualize, organize, and dramatize" the course. Each section has an introductory paragraph or two which is useful in the presentation of each method of food preservation.

Added feature of this manual, which is designed for a 16-week semester, is an appendix which includes a lecture outline, suggested laboratory rules, a list of equivalents, a Tagalog-English dictionary of food preservation terms, and tear-off sheets and questionnaires for each laboratory problem.

The author wishes to acknowledge the help of all those who made this manual possible. Thanks are especially due to the members of her family for their constant encouragement and to the faculty and students of the U.P. College of Home Economics for their technical assistance. Professor Matilde P. Guzman so generously imparted to us, her pupils, the wealth of her knowledge and experience. Miss Cecilia Florencio, Mrs. Felicidad Alandy Dy-Recto, Mrs. Susana Pascual-Guerrero, Miss Leonora Nigos, Mrs. Marietta M. Advincula, Miss Libia de Lima and Miss Ma. Aurora Bernardo commented on the procedures. Miss Teresita Reyes and Miss Maria Valledor typed the manuscript. To all those who have helped produce this manual, our heartfelt gratitude is extended.

SONIA Y. DE LEON, Ph.D.

Quezon City
July, 1966

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SECTION ONE

Introduction to Food Preservation

Food spoilage is a very real problem in the Philippines today. Large portions of fruits, vegetables, fish, and other food materials are going to waste. Food spoilage may be in the form of diminished nutritive or sanitary quality; it may mean an alteration in the taste, texture, appearance or other aesthetic quality of the food. No matter what form spoilage takes, it has to be minimized and possibly prevented. Food preservation, then, is the application of techniques to prevent or minimize undesirable changes in the food.

Food preservation is essential from a nutritional viewpoint. Protective foods have to be supplied in the quantity and quality that they are needed by the body. Preserving foods for future use saves time, energy, and money. Just think of the saving that comes with canning foods at the height of the season! We have perhaps taken the convenience of canned foods for granted. We still have to fully realize, also, the bounty made possible by other methods of food preservation.

Every housewife and every girl should start her home preserves for several reasons, namely: "to improve the general health of the family by supplying a more varied and balanced diet; to enable one to eat foods even when they are out of season; to prevent the waste of perishable foods by preserving them for future use; to enable the family to have additional income by selling preserves; to help mothers in building up happier and better homes; to give profitable work to idle hands; to enable the people to save the surplus products of one locality to sell to other localities where there is a shortage; to stimulate agricultural development by encouraging more foods to be planted and raised; to stabilize process by balancing the food supply, to lessen the amount of imported food products here; and to enable every family to have food in stock in cases of emergency." (SMB publication)

Food preservation is essential from an economic, hygienic, and aesthetic point of view. Let's start preserving now!

The first section deals with *what* is to be preserved and the second explains *why* food spoilage takes place. The rest of the manual is on *how* to preserve foods. It is hoped that this guide will help in making food preservation principles more understandable for as one of the pioneers in food preservation, W.W. Chenoweth, said, "Understanding is the beginning of all learning. What we understand is simple, what we do not understand is mysterious, uninteresting or fraught with doubt and fear."

Note to the teacher:

To insure more active participation and more thorough learning, divide the class into groups of 5 or 6. Assign a product leader who will be responsible for the preparation, evaluation, and report of one preserved food. The suggested method of evaluation is given at the end of lessons 48 and 49. Criteria for each product are given at the end of the procedure. The italicized words describe the ideal product.

This first section may be conducted as a discussion. Each group may spend some time deliberating on one topic. Then the leader may be asked to present the results of the group discussion to the class.

LABORATORY PROBLEM 1 Importance of Food Preservation

The World Food Situation

The quality and quantity of the nutrient intake of the majority of the people of the world today is not sufficient to meet their physiologic requirements. The third World Food Survey conducted by the Food and Agricultural Organization (FAO) of the United Nations showed that 10 to 15% of the world population is undernourished and almost half suffer from hunger or malnutrition or both. It also revealed that the diet in the less developed areas contained 2,150 calories per day as compared to the 3,050 calories in the developed regions. (Anon, 1963)

The nutritional picture is further complicated by the population explosion. The FAO report on "Agriculture in World Economy" emphasized that there was a positive trend of growth in world population from 1650-1950; the population doubled from 1700-1850, and from 1850-1950. There are approximately 3,000 million people in the world today. Taking into account this accelerating rate of increase, it seems likely that at the end of the century, the world population may exceed 6,000 million. All these facts present a very serious challenge to mankind. (Anon, 1962)

Philippine Food Situation

In the Philippines, nutritional surveys by the Food and Nutrition Research Center (FNRC) revealed that nutritional inadequacy is prevalent here as in other parts of the world. A recent survey in Luzon showed that the calorie intake in this region is only about 88% of recommended dietary allowance; calcium, 35%; vitamin A, 63%; thiamine, 76% and riboflavin, 35%. Clinical signs of vitamin A, riboflavin, vitamin C and iodine deficiency was evident. The biochemical phase of the study also showed among others widespread iron-deficiency anemia. (Anon, 1964)

The FNRC cited three possible causes for the nutritional status particularly in Metropolitan Manila, namely: low intake of dried beans, nuts and seeds, leafy and yellow vegetables, vitamin C-rich foods, milk, starchy roots and tubers, as well as sugars and sirups; the predominant use of polished rice over unpolished and of white over yellow *camote,* and finally very small intake of organ meats in the diet. (Anon, 1964).

Besides the nutritional inadequacies, another problem is the ever increasing population. The Philippines with a population of 30 million might have a population of 60 million by the year 2000.

ACTIVITIES

1. Discuss the importance of food preservation considering the present food situation in the Philippines and in the world.
2. Why is the knowledge of food preservation important to the different professions particularly to the housewife and the home economist?

LABORATORY PROBLEM 2 Preservation of Fruits and Vegetables

The Philippines is endowed with a wealth of tropical fruits and vegetables. These can be preserved in a variety of ways at home. The most common methods are by refrigerating, by freezing, by salting, by fermenting, by drying, by dehydration, by preservation in sugar, and by canning. Below is a list of 40 common fruits and vegetables together with data which might be helpful to consider in processing them. (Tables 1, 2, 3).

ACTIVITIES

1. Based on the three tables on processing possibilities of Philippine fruits and vegetables, prepare the processing schedule for the semester.
2. Prepare for the term report by reading up on the product assigned to the group.
3. Collect recipes on preserved fruits and vegetables.

REFERENCES

1. Caltex Philippines, Caltex Calendar of Philippine Fruits and Birds (Manila: Bureau of Printing, 1964).
2. Galang, F.G., "Flowering, Fruiting, and Harvesting of Philippine Fruit Trees," *Popular Bulletin 39* (Manila: Bureau of Printing, 1951).
3. Stewart, G., *Manila Cookbook* (Manila, 1958).

TABLE 1. PROCESSING POSSIBILITIES OF 40 PHILIPPINE FRUITS

NAMES (Common, English, Scientific)	HEIGHT OF SEASON	PROCESSING POSSIBILITIES
1. *Abokado* Avocado *Persia American Mill.*	Feb. - July	spread
2. *Anonas* Anonas *Anona reticulata Linn.*	May - July	frozen, juice, jam, butter
3. *Atis* Sugar apple *Anonas squamosa Linn.*	Sept. - Dec.	juice
4. *Balimbing* Carambola; bilimbi; starfruit *Averrhoa carambola Linn.*	April - June	candied
5. *Bayabas* Guava *Psidium guajava Linn.*	Sept. - Nov. June - October	jam, jelly, preserve, butter
6. *Bignay* *Antidesma bunius Linn.*	May - Aug.	*buro* (pickled) preserve, juice, marmalade, wine
7. *Kaimito* Star apple *Chrysophyllum cainito Linn.*	Jan. - March	wine
8. *Kalamansi* Philippine lemon *Citrus microcarpa Bunge*	June - Oct.	juice, candied rind concentrate
9. *Kamatsili* Aztec kwamochill *Pithecolobrium dulce Roxb.*	April - June	wine
10. *Kamyas* Bilimbi *Averroha bilimbi Linn.*	July - Sept.	candied, pickles, preserve
11. *Kasuy* Cashew *Anacardium occidentale Linn.*		candied, wine
12. *Katmon* Philippine dillenia *Dillentia philippinensis Rolfe*	Aug. - Sept.	pickles

NAMES (Common, English, Scientific)	HEIGHT OF SEASON	PROCESSING POSSIBILITIES
13. *Dalanghita* Native orange *Citrus nobilis Lour.*	Dec. - May	candied, juice, wine, preserve, marmalade
14. *Dayap* Lime *Citrus aurantifolia Christm.*	Sept. - Nov.	juice, marmalade, candied
15. *Duhat* Black plum, Java plum *Sizygium cumini Linn.*	March - July	juice, wine
16. *Durian* Durian *Durio Zibethinus Murr.*	Aug. - Oct.	preserve, candied, jam
17. *Granada* Pomegranate *Punica granatum Linn.*	April - July	preserve, candied, jam
18. *Guwayabano* Soursop *Anona muricata Linn.*	Aug. - Nov.	juice, frozen, jam, preserve
19. *Istroberi* Strawberry *Fragaria vesea Linn.*		jam, frozen
20. *Langka* Jackfruit *Artocarpus heterophyllus Lam.*	March - Aug.	candied, preserve, jam, ice cream, marmalade
21. *Lansones* Lanzon *Lansium domesticum Linn.*	Aug. - Nov.	wine
22. *Mabolo* Ebony *Diospyros discolor Willd.*	Aug. - Oct.	candied
23. *Makopa* Curacao apple *Syzygium samarengense (Blume) Merr. Perry*	May - July	candied
24. *Mangga* Mango *Mangifera indica Linn.*	May - June	juice, jam, ice cream, preserve, chutney, marmalade,-pickle

NAMES (Common, English, Scientific)	HEIGHT OF SEASON	PROCESSING POSSIBILITIES
25. *Mangostan* Mangosteen *Garcinia mangostana Linn.*	May - Nov.	jam, jelly, candy
26. *Mansanas* Apple *Pyrus malus Linn.*		canned, cider
27. *Milon* Melon *Cucumis melo Linn.*	April - July Nov. - Dec.	juice, preserve, candied, sherbet
28. *Pakuwan* Watermelon *Citrullis vulgaris Schrad.*	April - July	frozen, candied or pickled rind, juice, preserve
29. *Papaya* Papaya *Carica papaya Linn.*	December	frozen, pickle, ade, paste candy, jam, jelly, marmalade, juice, preserve
30. *Pasyonaryo* Passion Fruit *Passiflora foetida Lnn.*		canned, juice, jam, jelly
31. *Pinya* Pineapple *Anonas comosus (Linn.) Merr.*	May - July	preserve, jam, juice, frozen, marmalade
32. *Rambutan*		frozen, canned
33. *Saguing na saba* Banana *Musa sapientum Linn. var. compressa*	May - Aug.	preserve, candied catsup, jam
34. *Sampaloc* Tamarind *Tamarindus indica Linn.*	Sept. - Dec.	candied, preserve, jam, jelly, juice, sauce
35. *Santol* Santol *Sandoricum koetjape (Burmf.) Merr.*	July - Sept.	preserve, wine, vinegar, jelly, jam, marmalade, juice
36. *Serali* Governor plum *Flacourtia ramontchi L'herit*		jam
37. *Siniguelas* Spanish plum *Spondias purpurea Linn.*	April - June	preserve, juice

NAMES (Common English, Scientific)	HEIGHT OF SEASON	PROCESSING POSSIBILITIES
38. *Suha* Pomelo *Citrus grandis Osbeck*	Nov. - Jan. April - June	preserve, candied rind, juice
39. *Tiesa* Carristel tiesa *Lucuma hervosa A. DC.*		pudding
40. *Yambo* Malay apple *Syzgioem manacense Linn.*	Mar. - May	candied preserve

TABLE 2. PHILIPPINE FRUIT CALENDAR

JANUARY — Dalanghita, milon, pakuwan, sampalok, tsiko
FEBRUARY — Dalanghita, milon, pakuwan, tsiko
MARCH — Kaimito, dalanghita, duhat, milon, langka, tsiko, yambo
APRIL — Abokado, kaimito, kamatsili, dalanghita, duhat, granada, guwayabano, milon, langka, pinya, siniguwelas, tsiko, yambo
MAY — Abokado, anonas, bignay, kaimito, kamatsili, dalanghita, duhat, granada, guwayabano, makopa, mangga, milon, pinya, rimas, santol, siniguwelas, tsiko
JUNE — Abokado, anonas, bayabas, bignay, kalamansi, kamatsili, duhat, kamias, guwayabano, mabolo, makopa, mangga, pinya, santol, siniguwelas
JULY — Atis, abokado, bayabas, bignay, kalamansi, kamatsili, duhat, kamias, mabolo, makopa, mangga, pinya, santol, suha
AUGUST — Atis, bayabas, kalamansi, durian, guwayabano, kamias, katmon, lansones, mabolo, rimas, saguing
SEPTEMBER — Atis, balimbing, bayabas, kahel, kalamansi, dayap, durian, katmon, granada, guwayabano, kamias, lansones, saguing, suha
OCTOBER — Atis, balimbing, bayabas, kahel, kalamansi, dayap, granada, guwayabano, lansones, mabolo, saguing, suha
NOVEMBER — Atis, balimbing, kahel, dayap, granada, guwayabano, langka, mangostan, sampalok, suha
DECEMBER — Dalanghita, mangostan, papaya, sampalok

TABLE 3. PROCESSING POSSIBILITIES OF 40 PHILIPPINE VEGETABLES

	TAGALOG NAMES	ENGLISH NAMES	SCIENTIFIC NAMES	PROCESSING POSSIBILITIES
1.	Abitsuwelas	Snapbeans	*Phaseolus vulgaris Linn.*	canned, frozen
2.	Ampalaya	Bitter melon	*Momordica charantia Linn.*	pickled, canned
3.	Bataw	Hyacinth bean	*Doliches lablab Linn.*	dried, powdered, pickled
4.	Bawang	Garlic	*Allium sativum Linn.*	dried, powdered pickled
5.	Kalabasa	Squash	*Cucurbita maxima Duchesne*	canned, sweetened candied
6.	Kamatis	Tomatoes	*Lypersicum esculentum Mill.*	canned, juice puree, catsup, sauce
7.	Kamote	Sweet potato	*Ipomea batatas (Linn.) Poir*	candied, dehydrated powdered
8.	Kamoteng Kahoy	Cassava	*Manihot esculentum Crantz Pobl.*	fermented dehydrated
9.	Kaong	Sugar palm	*Arenga pinnata (Wurmb.) Merr.*	preserve, canned
10.	Karot	Carrot	*Daucus carota Linn.*	canned, pickled
11.	Koliplawer	Cauliflower	*Brassica oleracea Linn.*	canned, pickled
12.	Gabi	Taro	*Colocasia esculentum (Linn.) Schotti Endl.*	
13.	Garbansos	Chickpeas	*Cicer arietinum Linn.*	dried, canned
14.	Labong	Bamboo shoot	*Bambus spinosa Roxb.*	pickled, canned
15.	Luya	Ginger	*Zingiber officinale Rosc.*	candied, dehydrated pickled, powdered
16.	Malunggay	Horse radish	*Moringa olegigera Linn.*	boiled
17.	Mani	Peanut	*Arachis hypogaea*	candied
18.	Munggo	Mung beans	*Phaseolus aureus Roxb.*	dried, powdered
19.	Niyog	Coconut	*Cocos nucifera Linn.*	dried, candied, preserve, fermented

	TAGALOG NAMES	ENGLISH NAMES	SCIENTIFIC NAMES	PROCESSING POSSIBILITIES
20.	Paayap	Cowpeas	*Vigna sinensis (Linn.) Savi*	dried, canned
21.	Patani	Lima beans	*Phaseolus lunatus Linn.*	dried, pickled, canned
22.	Patatas	Potatoes	*Solanium tuberosum Linn.*	dried, canned, powdered
23.	Pepino	Cucumber	*Cucumis sativus Linn.*	pickled
24.	Petsay	Chinese cabbage	*Brassica chinensis Linn.*	pickled
25.	Repolyo	Cabbage	*Brassica oleracez Linn.*	fermented
26.	Sayote	Chayote	*Sechium edule Sw.*	preserved, pickled, canned
27.	Sigarilyas	Goa or winged bean	*Psophocarpus tetragonolobus Linn.*	canned, pickled
28.	Sibuyas Tagalog	Tagalog onion	*Allium cepa Linn. var ascolonicum*	pickled, canned
29.	Sibuyas, Bombay	Bombay onion	*Allium cepa Linn.*	pickled, powdered, dried
30.	Sili	Sweet pepper	*Capsicum annum Linn.*	pickled, canned
31.	Sili labuyo	Chili pepper	*Capsicum frutescens (Linn.) Fruw.*	dried, canned
32.	Sinkamas	Yam bean	*Pachyrrhizus erosus (Linn.) Urb.*	dried, canned sweetened
33.	Sitaw	Yard-long bean	*Vigna sinensis var. sesquipedalis Fruw.*	canned, frozen
34.	Sitsaro	Sweet peas	*Pisum sativum Linn.*	canned
35.	Talong	Eggplant	*Solanum melongena Linn.*	pickled, canned
36.	Toge	Mung bean sprout	*Phaseolus aureus Roxb.*	canned, dehydrated, pickled
37.	Tubo, katas	Sugar cane juice	*Saccharum officinarum Linn.*	canned
38.	Tugi	Spiny yam	*Dioscorea esculenta (Lour.) Burkill*	jam, dehydrated
39.	Ubi	Yam	*Dioscorea alata Linn.*	jam, dehydrated, candied
40.	Upo	Bottle gourd	*Lagenaria siceraria (Mill) Standly*	canned

LABORATORY PROBLEM 3 Preservation of Meat and Fish

Meat and fish products lend themselves to a variety of processing methods. Table 4 gives some possible uses of pork cuts while Table 5 gives the uses of pork internal organs. Figure 1 shows the location of cuts useful for various preserved products.

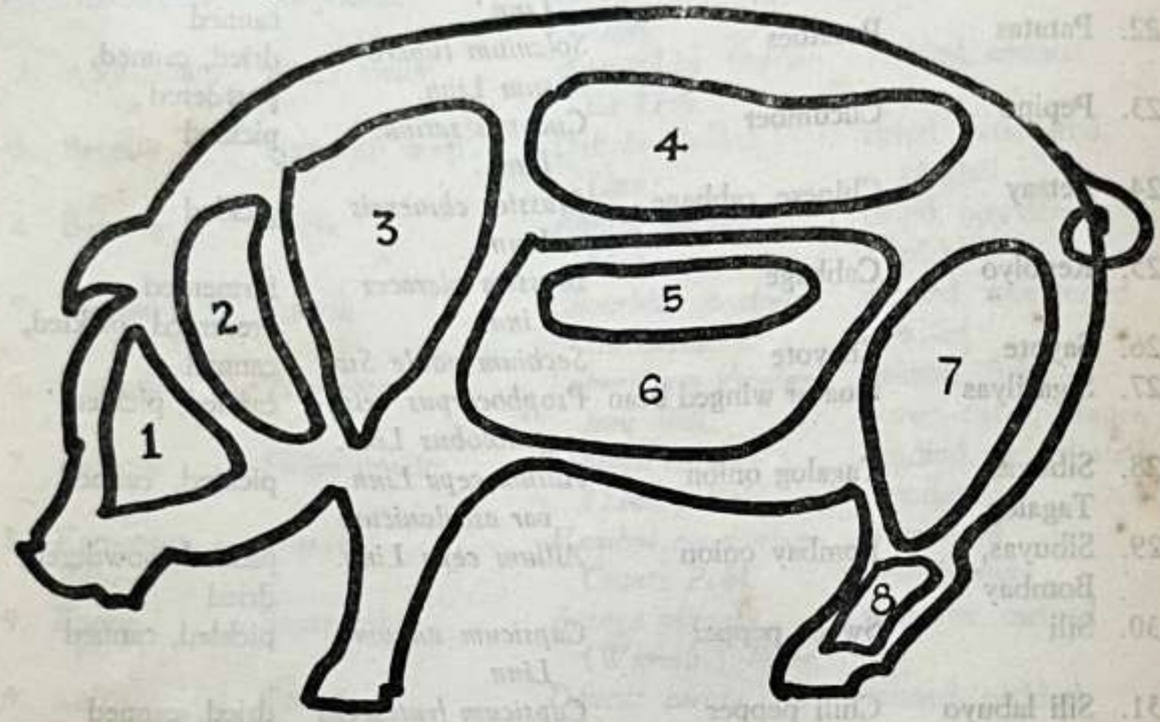


Figure 1. *Pork Preservation Chart*

PORK PRESERVATION CHART

	ENGLISH NAMES	TAGALOG NAMES	USES
1	Head	Ulo	Dinuguan, Kulaoc, Kilawin
2	Jowl	Kalamnan	Asado
3	Picnic	Kasim	Picnic shoulder, Tucino, Meat Balls, Dinuguan, Adobo, Pastel
4	Porkchops	Costillas	Breaded Pork Chops, Boiled, Grilled Barbecue
5	Side Bacon Belly	Liempo sa tiyan	Lechon, Bacon, Salt Pork
6	Loin, found with inner part of spare ribs	Lomo	Canadian Bacon, Steaks, Shiz-Habobs Loin Roast
7	Ham	Pigi	Pork pata with garbanzos and Sausage Piquat, Pork ala Jardiena, Pork Fritado, Chow Chee Yolk, Humba
8	Foot, Hocks	Pata	Pickled Foot

Table 4. Pork Processing Chart

PARTS		USES
Tagalog Name	*English Name*	
Ulo	Head	Dinuguan, kulaoc, kilawin
Kalamnan	Jowl	Asado
Kasim	Picnic	Picnic, ham, tucino, meat balls, dinuguan, adobo, pastel
Taba sa likod	Fatback	Saltpork, longanisa, kikyam
Costillas	Porkchops	Breaded, broiled, grilled, barbecue
Tadyang	Bacon Spareribs	Sinigang, barbecue, spareribs, bacon, saltpork
Liempo sa tiyan	Side back belly	Lechon, bacon, saltpork
Lomo	Loin	Canadian bacon, steaks, shiz kabob
Pigi	Ham	Ham, piquat, pork a la jardiniera, pork fritada, pork humba, pork suam
Pata	Foot, hocks	Pickled feet, pork *pata* with garbansos and sausage
Balat	Skin	Cicharon, sausages (cured, dried and/or cooked)

Table 5. Uses of Internal Organs of the Pig

INTERNAL ORGANS		USES
Tagalog Name	*English Name*	
Puso	Heart	Bachoy, bopiz, dinuguan, egado
Atay	Liver	Liver spread, bachoy, bopiz, dinuguan, egado, adobo
Bato	Kidney	Bachoy, bopiz, dinuguan, egado
Dugo	Blood	Dinuguan
Baga	Lungs	Dinuguan, egado, bopiz
Lapay	Pancreas	Dinuguan, egado, bopiz
Empella	Omentum	Dinuguan, egado
Trepella	Small intestines or uterus	Adobo, kilawin, dinuguan, bopiz, egado
Tastasin	Omentum	Dinuguan, bopiz
Bahay guya	Uterus	Dinuguan, bopiz
Lalaogan	Esophagus	Egado, bopiz
Tito	Stomach of the pig	Adobo, kilawin, dinuguan, paksiw, egado, bopiz

ACTIVITIES

1. Visit a well-stocked grocery and survey their preserved meat and fish lines. List in table form the different types of products noting the brand, size of container, weight or count, price per package and cost per unit weight. Take note of their canned, salted, cured, powdered and /or dried meat and fish products.
2. Prepare a list of the types of products you would like to prepare this semester.
3. Clip recipes and illustrations on preservation of meat and fish products.

REFERENCES

1. Cruess, W.V. 1958. *Commercial Fruit and Vegetable Products,* 4th ed. (McGraw Hill Book Co., Inc., N.Y. 1958.)
2. Desrosier, N.W. *The Technology of Food Preservation.* (Avi Publishing Co., Inc., Westport, Conn. 1963.)
3. Hawthorn, J. and J.M. Leitch. *Recent Advances in Food Science.* 3 vols. (Butterworth, London, 1962.)
4. Jacobs, M.B. *The Chemistry and Technology of Food and Food Products.** (Interscience publishers, London, 1957.)
5. Justin, M.M., L.O. Rust and V.E. Vail. *Foods: An Introductory College Course,* 4th ed. (Houghton Mifflin Co., Boston, 1956.)
6. Sutherland, E. and P.M. Nelson. *Food Preparation, Principles and Procedures.* A laboratory manual for college courses in food preparation, 5th ed. (Wm. C. Brown and Co., Iowa, 1958.)
7. Sweetman, M.D. and I. Mackeller. *Food Selection and Preparation,* 4th ed. (John Wiley and Sons, N.Y., 1954.)

SECTION TWO

Spoilage Agents

"To be forewarned is to be forearmed." Knowing the enemy is one of the effective principles of warfare. We are waging a war against enzymes and micro-organism, and in this battle, it is good to know the conditions that favor the growth of the different spoilage agents.

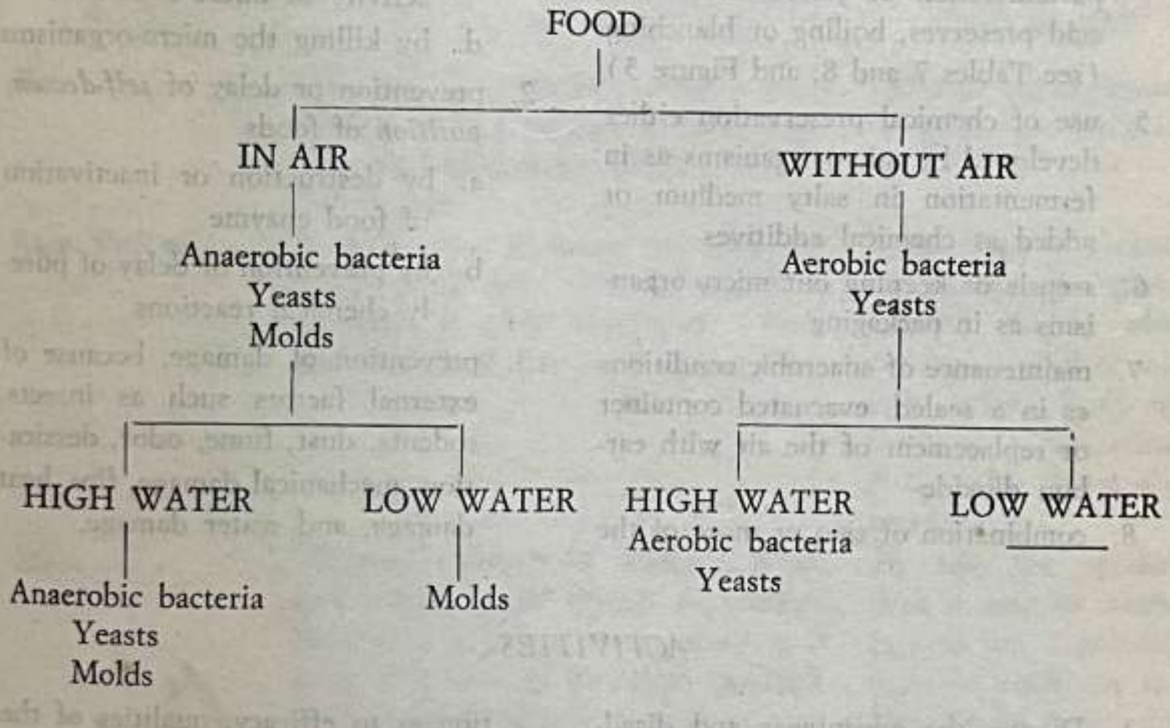

FOOD
IN AIR
WITHOUT AIR
Anaerobic bacteria
Yeasts
Molds
Aerobic bacteria
Yeasts
HIGH WATER
LOW WATER
HIGH WATER
LOW WATER
Aerobic bacteria
Yeasts
Anaerobic bacteria
Yeasts
Molds
Molds

Fig. 2. Microbial Food Spoilage

Note to the teacher:

Discuss Figure 2 on Microbial Food Spoilage.

Use illustrative materials to bring out the important points in this lesson. It would be most useful to have slides of bacteria under the microscope together with examples of spoilage of foods caused by the different spoilage agents.

Laboratory Problems 4-6 have discussions, demonstrations, and activities which may be assigned to individuals; Laboratory Problem 7 involves actual performance by the whole group.

LABORATORY PROBLEM 4 Methods of Food Preservation

The common methods of food preservation are:

1. removal of micro-organisms as in washing and trimming
2. use of low temperatures as in refrigeration and freezing (see Table 8)
3. drying as in sun drying and dehydration
4. use of high temperatures as in pasteurization of juices and acetic acid preserves, boiling or blanching (see Tables 7 and 8, and Figure 3)
5. use of chemical preservation either developed by micro-organisms as in fermentation in salty medium or added as chemical additives
6. asepsis or keeping out micro-organisms as in packaging
7. maintenance of anaerobic conditions as in a sealed, evacuated container or replacement of the air with carbon dioxide
8. combination of two or more of the methods; the best example of which is canning

The principles underlying these methods of preservation are as follows:

1. prevention or delay of *microbial* decomposition
   a. by keeping out micro-organisms (asepsis)
   b. by removal of micro-organisms
   c. by hindering the growth and activity of micro-organisms
   d. by killing the micro-organisms
2. prevention or delay of *self-decomposition* of foods
   a. by destruction or inactivation of food enzyme
   b. by prevention or delay of purely chemical reactions
3. prevention of damage, because of external factors such as insects, rodents, dust, fume, odor, dessication, mechanical damage, fire, heat damage, and water damage.

ACTIVITIES

1. Discuss the advantages and disadvantages of each of the common methods of food preservation.
2. Cite examples of products preserved by each of the common methods of food preservation.
3. Compare the methods of preservation as to efficacy, qualities of the finished product, and economy.
4. Deliberate on the effects of different methods of preservation on the retention of nutrients in foods.
5. Observe the retention of flavor and color in some preserved foods.

LABORATORY PROBLEM 5 Tests for Food Spoilage

When is food fit to eat? When, in turn, is food spoiled? Although it has been said that one man's food is another man's poison, still, there are certain basic criteria for assurance of fitness. Frazier (1958) lists them as follows:

1. The desired stage of development and maturity
2. Freedom from pollution at any stage in production or handling
3. Freedom from objectionable change resulting from microbial attack or action of enzymes of the food.

Table 6 gives a list of tests for spoilage.

TABLE 6. HOUSEHOLD TESTS FOR FOOD SPOILAGE

FOOD	*INDICATIONS OF SPOILAGE OR CONTAMINATION*	*COMMENTS*
Fish	Gills gray or greenish. Eyes sunken. Flesh is easily pulled away from bones. Fingernail indentation persists in flesh. Fish is soft.	Off-odor can be detected quite frequently in spoiled fish.
Raw Shrimp . . .	A pink color develops on upper fin and near the tail. Off-odor similar to ammonia is often detectable. Firm, darkened head and easily detachable.	Some types of shrimp are naturally pink. Cooked shrimp also develops a pink or salmon color. Both of these are wholesome if the odor is not abnormal.
Meat	Off-odor is detectable. Slimy to touch. Beef usually spoils first on the surface. Pork usually spoils at the juncture of bone and meat in the inner portions. Turning bluish-green on surface.	To test for spoiled pork it may be necessary to use a pointed knife to reach the interior of the meat. An off-odor on the knife is an indication of spoilage.
Dressed Poultry .	Stickiness appears first under the wing, at the juncture of legs and body and on the upper surface of the tail end. Darkening of the tips of the wings sometimes indicates spoilage.	Dressed poultry should be washed thoroughly before cooking and the hands likewise should be washed after handling or drawing the poultry.

Fruits and vegetables	Evidence of a white or grayish powder indicates spray residues. These chemicals may be poisonous and should be washed off. The chemical may be present around the stems of fruit and at the juncture of the leaves and the stems of cabbage, cauliflower, celery, and lettuce.	Most of the chemicals used by growers are not dangerous; some may be. All fruits and vegetables must be washed before eating or cooking. Cooking will not destroy the spray.
Cereals	Insect infestation will be readily seen if the cereal is spread on brown paper. Adjoining batches of cereal on the pantry shelf also should be examined and the containers in which the infested cereals were stored should be scalded and dried before being used again.	None of the insects that usually infest cereal are dangerous—even if accidentally consumed. However, no one wants to eat such infested food.
Salads	There is no specific test for salads. Chicken salad, tuna, and other fish salads, non-acid potato salad, all types of cold cuts must be kept refrigerated at all times. All have been touched with the hands during their manufacture and may be considered slightly infected.	Refrigeration of these foods will keep any possible infection from increasing. Spoilage is often impossible to detect until these foods are totally spoiled. Serve salads immediately after taking from refrigerator.
Frozen Foods . .	Frozen foods, like ice cream, will spoil if kept out of the refrigerator for any great length of time. Spoilage is caused by the warming of these foods to room temperature and the resulting growth of bacteria in or on the food.	Cook frozen vegetables thoroughly before serving to destroy any infection that may be present. Frozen food are not refrigerated but must be placed in a freezer.
"Left-over" food	The off-odor of spoiled food is not always perceptible. Do not serve "left-over" cooked food after 36 hours even if it is refrigerated unless it is cooked again thoroughly.	Bacterial spoilage of food begins as soon as it becomes warm. Refrigeration will retard this bacterial action and delay the spoilage. Refrigerating the food below 45°F between serving and cooking thoroughly before

		serving will keep the food safe.
Canned food . .	Swelled top and bottom. Dented areas along the seams. Abnormal odor of contents. Indications of foaming. Milkiness of liquor above food.	These indications of spoilage apply to canned vegetables, meats, fish, and poultry. Home-canned meats and vegetables must be cooked thoroughly before serving.

A GOOD RULE TO FOLLOW: "WHEN IN DOUBT, THROW IT OUT."

ACTIVITIES

1. Discuss the characteristics of the ideally canned product.
2. Demonstrate the tests for prime quality in fruits and vegetables meats and fish.
3. Display examples of fresh products side by side with spoiled ones.

LABORATORY PROBLEM 6 Spoilage Agents

Spoilage in foods which is decay or decomposition of undesirable nature may be due to microbiological, macrobiological, chemical, and physical causes. Under microbiological factors are included yeast, mold, and bacterial activity; under macrobiological, insect, rodent, and damage by other animals; under chemical, those catalyzed by enzymes of the tissues or micro-organisms, and under physical, such changes as those caused by freezing, burning, drying, pressure, and others.

Read up on spoilage agents and fill the tables at the end of the manual.

REFERENCES

1. Anon. *Proceedings of the Symposium on Low Temperature. Microbiology.* (Campbell Soup Co., 1961.)

2. Bryan, H.H. and C.G. Bryan. *Bacteriology. Principles and Practice,* 3rd ed. (Barnes and Noble, N.Y., 1942.)

3. Christiansen, C.M. *The Mold and Man.* (University of Minnesota Press, Minneapolis.)

4. Frazier, W.C. *Food Microbiology.* (McGraw Hill Book Co., N.Y. 1958.)
5. Pelczar, R.J. and R.D. Reid. *Microbiology. Principles and Practice.* (McGraw Hill Book Co., N.Y., 1958.)
6. Prescott, S.C. and C.G. Dunn. *Industrial Microbiology,* 3rd ed. (McGraw Hill Book Co., N.Y., 1959.)
7. Schilborn, M. von. 1951. *Control of Microorganism Causing Spoilage in Fruit and Vegetable Products. Advances in Food Research.*
8. Shultz, H.V. *Food Enzymes.* (Avi Publishing Co., Westport, Conn., 1960.)
9. Tanner, F.W. *The Microbiology of Foods,* 2nd ed. (Gerrard Press, 1944.)
10. Weiser, H.H. *Practical Food Microbiology and Technology.* (Avi Publishing Co., Inc., Westport, Conn., 1962.)
11. White, J. *Yeast Technology.* (John Wiley and Sons, N.Y., 1954.)

LABORATORY PROBLEM 7 Growth of Spoilage Agents

The study of the requirements for the development of yeast in bread can serve as a lesson for the study of other spoilage agents like bacteria, mold enzymes. On a given food, specific organisms are found to develop and thus, deterioration of the food takes place.

1. To observe the effect of temperature on the growth of yeast.

   Hydrate 1 teaspoon dry active yeast in 1 tablespoon of water. Blend thoroughly with a pint of water and 1 tablespoon of sugar. Divide into four portions.

   a. Freeze a portion of the mixture to 0°C (32°F) (use a thermometer to check the temperature every time. Report on observation sheet). Thaw at room temperature. (It may be necessary to do this a day before the laboratory class period.)

   b. Boil another portion and cool at room temperature.

   c. Keep a third portion at room temperature.

   d. Chill a fourth portion by setting in a bowl of crushed ice.

   Fill uniform-sized jars (1/2 pint jars may be suitable) with each of the above. Cover each jar with a plate and invert carefully to prevent spilling before you are ready to observe results.

   Keep a, b, and c at room temperature (record room temperature) and d packed in ice until one hour before the end of the laboratory period.

   Observe results. Explain in the answer sheet given at the end of the manual.

2. To observe the effect of food con-

ditions on the growth of yeast.

Hydrate 2 teaspoons dry active yeast in 2 tablespoons water. Divide into 8 portions. Blend the yeast portions as indicated below and observe the action of the yeast in the different mixtures.

Use 1/8 portion of the yeast for each part of the experiment and have all liquids lukewarm (90°F).

a. with 1/2 cup water

b. with 1 teaspoon flour and 1/2 cup water

c. with 1/2 cup milk

d. with 1 teaspoon flour and 1/2 cup milk

e. with diluted potato water (cooked, mashed, and cooled potato)

f. with 1 teaspoon starch and 1/2 cup water

g. with 1/2 cup water and 1 teaspoon sugar

h. with 1/2 cup water and 1 teaspoon cooking oil

Turn into jars as in 1. Observe results. Explain in the tear-off sheets at the end of the manual.

3. To observe the effect of moisture on the growth of yeast.

Hydrate 1 teaspoon dry active yeast in 1 tablespoon water. Combine with 1/2 cup lukewarm (90°) water and 1/2 tablespoon sugar. Divide into two portions.

a. To one portion add 3/4 cup sifted all-purpose flour (75 grams) to make a soft dough. Blend thoroughly until smooth. Turn into two uniform tumblers. Note initial volumes in cubic centimeters and increase in volumes after 30, 60, and 90 minutes.

To get volume, place an empty tumbler side by side with the tumbler of dough, making sure that both tumblers are on a level surface. Fill the empty tumbler with water to the level of the dough. Transfer this water to a graduated cylinder and note volume in cubic centimeters.

b. To another portion add 1 cup all-purpose flour (100 grams) to make a stiff dough. Blend thoroughly and knead until smooth and elastic. Divide the dough into two. Turn into two uniform tumblers, flattening dough to fill the tumblers.

Note initial volumes and increases in volumes after 30, 60, and 90 minutes.

Keep yeast mixtures in a water bath held at 100°F. Observe and tabulate results in the tear-off sheets at the end of the manual.

Note to the teacher:

Ask one of the students to demonstrate the measurement of volume increase in the fermenting dough and the displacement of the liquid medium by carbon dioxide generated by the yeast cells.

SECTION THREE

Proper Storage

LABORATORY PROBLEM 8 Storing Foods

DO'S AND DON'T'S ON STORING FOODS AT ROOM TEMPERATURE

A. FRUITS

1. *DO* keep unripe fruit at room temperature.
2. *DO* store ripe fruit (except pineapple, banana) in cool place.
3. *DO* place cut lemons, oranges, melons, cut-side down in plate or in covered container and store in refrigerator.
4. *DO* keep fresh berries wrapped in paper in refrigerator; wash and hull shortly before using. Keep left-over hulled berries in tightly covered glass jar in refrigerator.
5. *DO* sort fruits carefully and remove any overripe fruits.
6. *DON'T* pile soft fruits in storage.
7. *DON'T* store in warm place unless you want to speed ripening.
8. *DON'T* wash fruits too soon as this tends to make it soft.

B. VEGETABLES

1. *DO* store potatoes, onions, beets, carrots, other root vegetables in a cool, dry, well ventilated place. Keep other vegetables in crisper of refrigerator.
2. *DO* trim off inedible leaves from salad greens as soon as you reach home. Store unwashed in tightly covered container plastic bag in refrigerator.
3. *DO* wash vegetables as needed to avoid rusting.
4. *DO* place cut garlic, and onions cut-side-down in glass jar and cover tightly or wrap in aluminum foil. Cover and store in refrigerator.

C. MEAT AND FISH

1. *DO* remove wrapping of *fresh meat*. Cover loosely with waxed paper and leave ends open. Store in coldest part of refrigerator in meat unit or drip tray under freezing compartment. If possible, use within 2 or 3 days.
2. *DON'T* freeze *cured meats*. Store the same as fresh.
3. *DO* cover *ground meat* loosely with waxed paper and store as

for fresh meat. Ideally serve within 24 hours. If kept longer, wrap each serving and freeze.

4. *DO* store *variety meats* as ground meat.
5. *DON'T* cut, grind or slice cooked meat like *relleno* (baked chicken rolls), *gallantina* (steamed chicken roll) and other types of meat loaves, until ready to use. Cover tightly in dish or with foil to prevent drying, and store in coldest part of the refrigerator.
6. *DON'T* unwrap *frozen meat.* Store in freezing unit until ready to use. Use promptly after thawing. Avoid refreezing.
7. *DO* wrap *poultry* loosely and store in coldest part of refrigerator. Use whole birds within 2 to 3 days and cut-up birds within 24 hours. If to be kept longer, freeze.
8. *DO* wrap fresh fish completely or place in a tightly covered dish in the coldest part of the refrigerator. Cook within 24 hours. Store cooked fish as cooked meat.

D. BAKED PRODUCTS

1. *DO* store bread at room temperature in covered metal bread box ventilated with tiny air holes. Keep in refrigerator to prevent molding but bear in mind that here it stales more quickly than in bread box.
2. *DO* keep thin, crisp cookies in can with loose cover.
3. *DO* store *soft cookies* in air-tight container.
   Moisten and mellow cookies with slices of apple or orange but remember to change fruit frequently.
4. *DO* refrigerate *cakes with cream filling.*
5. *DO* store cooled *cakes* in a container with a tight cover or invert a large bowl over the cake plate.
6. *DO* cover *fruit pies* with waxed paper or aluminum and place on the pantry shelf. Freshen by heating a few minutes in warm oven.
7. *DO* always refrigerate *cream, custard, and whipped cream pies* before and after serving.

E. SHORTENINGS

1. *DO* keep *margarine, butter, lard and other shortenings* closely covered in refrigerator.
2. *DO* strain drippings directly into container and store in refrigerator.

F. EGG AND DAIRY PRODUCTS

1. *DO* tightly cover *soft cheese* and refrigerate.
2. *DO* wrap *hard cheese* in waxed paper before refrigerating.
3. *DO* grate left-over cheese and keep in covered jar.
4. *DO* keep milk, cream, and eggs (unwashed until ready to use) near freezing unit in refrigerator.

G. STAPLE SUPPLIES

1. *DO* keep *rice and other cereals* tightly covered in cool dry place.
2. *DON'T* store whole wheat or other coarse flours or cereals near *white flour.*

ACTIVITIES

Answer the questions at the end of the manual pertinent to this lesson.

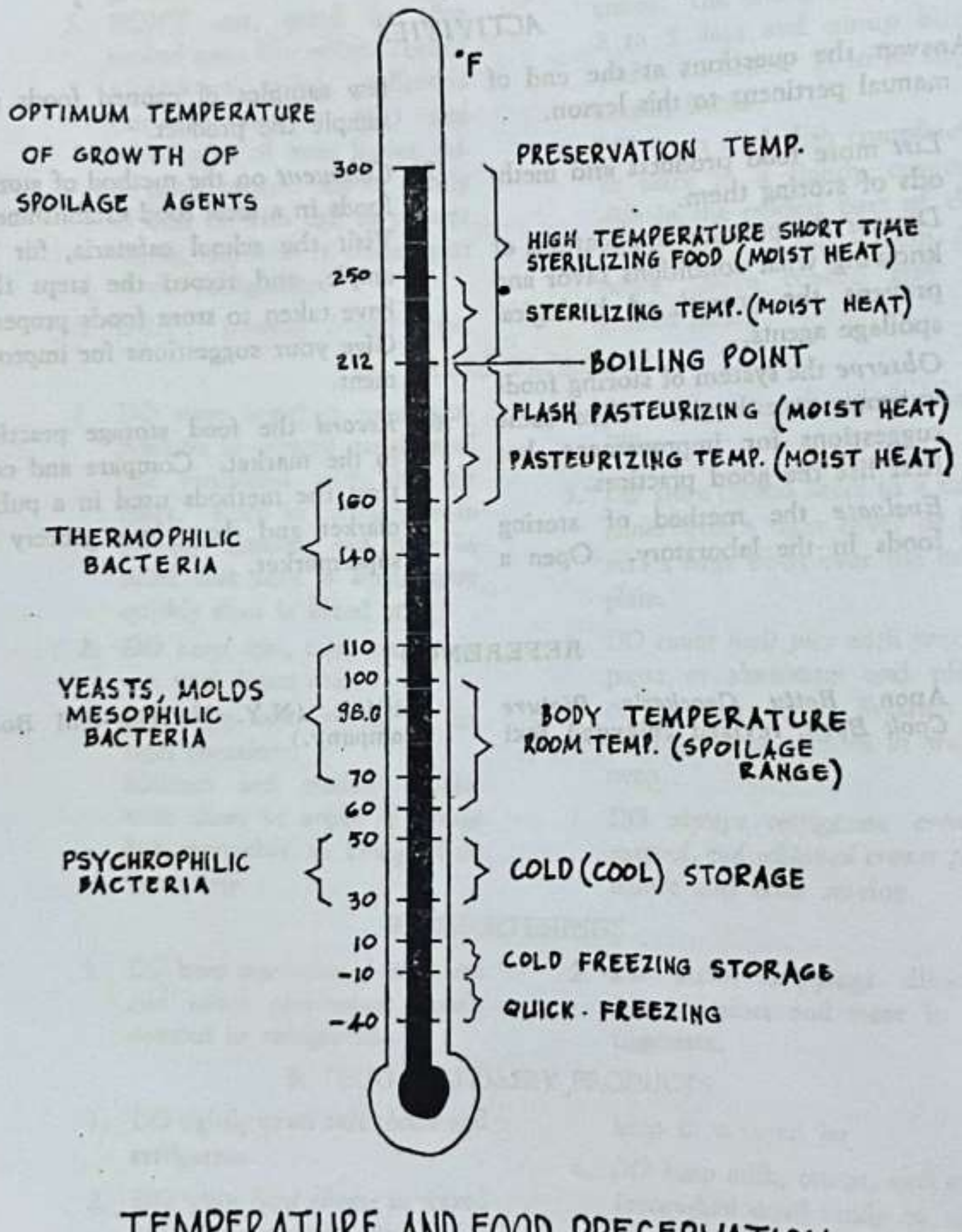
1. *List* more food products and methods of storing them.
2. *Discuss* the practical applications of knowing what conditions favor and prevent the growth of biological spoilage agents.
3. *Observe* the system of storing foods in your own home. Give some suggestions for improvement, but first list the good practices.
4. *Evaluate* the method of storing foods in the laboratory. Open a few samples of canned foods and sample the product.
5. *Comment* on the method of storing foods in a local food establishment. Visit the school cafeteria, for example, and record the steps they have taken to store foods properly. Give your suggestions for improvement.
6. *Record* the food storage practices in the market. Compare and contrast the methods used in a public market and those in a grocery or supermarket.

REFERENCE

1. Anon. *Betty Crocker's Picture Cook Book,* revised enlarged text edition. (N.Y. McGraw-Hill Book Company.)

SECTION FOUR

Refrigeration


°F
OPTIMUM TEMPERATURE OF GROWTH OF SPOILAGE AGENTS
PRESERVATION TEMP.
300
HIGH TEMPERATURE SHORT TIME STERILIZING FOOD (MOIST HEAT)
250
STERILIZING TEMP. (MOIST HEAT)
212
BOILING POINT
FLASH PASTEURIZING (MOIST HEAT)
PASTEURIZING TEMP. (MOIST HEAT)
160
THERMOPHILIC BACTERIA
140
110
100
YEASTS, MOLDS MESOPHILIC BACTERIA
98.6
BODY TEMPERATURE
ROOM TEMP. (SPOILAGE RANGE)
70
60
50
PSYCHROPHILIC BACTERIA
COLD (COOL) STORAGE
30
10
-10
COLD FREEZING STORAGE
QUICK-FREEZING
-40

TEMPERATURE AND FOOD PRESERVATION

An appreciation of the effect of temperature on food is fundamental. In a tropical country such as ours, foods spoil quickly. It is therefore important that we learn to use refrigerators properly. We should also make provisions for such times as when refrigerators cannot be used or are not available.

Note to the teacher:

This is the time to stress the importance of temperature to food preservation. The temperature chart of food preservation and the tables on temperature (Tables 7 and 8) can be discussed now with emphasis on the refrigeration of perishables.

TABLE 7. USEFUL TEMPERATURES

Temperature (°F)	Effect
—80	All water probably as crystals in frozen food
—20 to —30	Common food freezing temperature
0 to —10	Common frozen food storage
32	Freezing point of water
30 to 34	Common cold-storage temperature
98.6	Temperature of man's body
145	Holding pasteurization of milk (30 minutes)
160	High temperature—short time (HTST) pasteurization of milk (15 seconds); upper range of growth of thermophilis; ropy bacteria killed
212	Boiling point of water at standard pressure short exposure kills most vegetative cells

TABLE 8. INFLUENCE OF TEMPERATURE ON FOOD

Operation	Temperature Range (°F)
Quick freezing	—10 to —40
Cold (freezing) storage	—10 to 10
Cold (cool) storage	30 to 50
Room temperatures (spoilage range)	60 to 100
Pasteurizing temperatures (moist heat)	142 to 212
Flash pasteurizing (moist heat)	160 to 212
Sterilizing foods (moist heat)	212 to 250
HTST sterilization food (moist heat)	240 to 300
Meat roasting (dry heat)	300 to 500

LABORATORY PROBLEM 9 The Refrigerator

The refrigerator is used to cool food items below the temperature of the surrounding atmosphere to preserve the food. There are foods that *must* be refrigerated and there are others that *may* be refrigerated.

Foods that must be refrigerated:

1. Meat
2. Dairy products
3. Fowl
4. Fish
5. Salad greens
6. Soft berries
7. Soft fruits
8. Opened canned goods
9. Leftovers

Foods that may be refrigerated:

1. Citrus fruits
2. Bottled beverages
3. Baked goods
4. Chocolate
5. Nuts and dried fruits

Since the preservation of food is the main purpose of the refrigerator, it must be well taken care of. Here are some tips for the proper use and care of a refrigerator:

1. Put only clean food in the refrigerator.
2. Put only clean containers in the refrigerator. For instance, wipe off the milk bottles before refrigerating them.
3. Keep the refrigerator door closed.
4. Keep fatty substances and hands off the rubber seal or gasket of the refrigerator door. A gasket kept in good condition seals the cold air in the refrigerator.
5. Wash and clean the refrigerator once a week with warm water, to which a little baking soda (1 teaspoon/quart water) has been added. Exterior should be washed with soap and water, then rinsed dried. Avoid abrasives.
6. Remove ice cubes by letting cold water run over them in the ice-cube pan. Removing them with the ice pick is liable to puncture the pan.
7. Defrost the refrigerator as follows: (a) turn off the freezing unit, (b) refill the ice cube pan with warm (not hot) water, and place it on the bottom shelf of the freezing unit, (c) keep the drip tray in place to catch the melting ice that drops off the freezing, (d) wash and refill the ice-cube pans. Also wash the refrigerator and the drip pan at this time. Never try to speed defrosting by prying ice off, (e) when done, turn the freezing unit on.

To Save Food:

1. Cool all hot foods before placing them in the refrigerator. Foods that are refrigerated before complete cooling can cause severe types of food poisoning. The interior of the food must be com-

pletely cooled before refrigerating. Quick cooling may be done by putting the food container in a pan of cold water to which ice cubes have been added.

2. Cover all foods placed in the refrigerator. Use food bags, covered ice-box dishes, bowl covers, hydrator, or crispers. These keep foods from drying out and from picking up other flavors. In the case of vegetables, covering makes them more crisp. In refrigerators that supply moist air, foods need not be covered.
3. Overloading raises the temperature inside the refrigerator. Foods should be kept at an average of 40°F to insure against spoilage.
4. Food will not keep indefinitely in a refrigerator. Avoid storing even frozen foods too long.
5. Place foods that spoil most easily nearest the freezing compartment, and those that spoil least easily, farthest from the freezing compartment. Foods that are not to be frozen should be kept farthest from the freezing unit.
6. Arrange foods to allow the cold air to circulate around them for thorough chilling.
7. Remember that the coldest spot in the refrigerator is just below the freezing unit. The next coldest spot is next to the freezing compartment.
8. Remove store wrappings from food before refrigerating except moisture-proof and vapor-proof wrappings. Wrapped foods take longer to chill than unwrapped foods.

TABLE 9. FOODS REQUIRING REFRIGERATION

FOOD		MAXIMUM STORAGE TIME
Meat	Store in meat drawer (if refrigerator is equipped with it) or directly under the freezer. Lightly cover freshly cut meat with a loose wrapping of waxed paper as fresh meat and organ meats spoil more quickly than others. Store loosely wrapped, and cook within 48 hours. Keep smoked meat tightly wrapped during storage.	3 days
Fruits, vegetables	Vegetables should be stored in crisper or on lower shelf, covered; asparagus, beans, broccoli, cabbage, cauliflower, celery, corn, cucumbers, green onions, peas, peppers, mushrooms, radishes.	7 days

	Fruits covered or uncovered. Strawberries and other berries (unless to be used in short time) should not be washed—but sorted, spread out on tray or put back into basket—on refrigerator shelf.	
Eggs	Keep in covered container with large end up to help keep yolk centered. Store opened eggs in tightly covered jar.	14 days
Fats		
Butter	On shelf near freezer.	14 days Until used.
Lard, margarine, drippings, rendered fats, opened salad oil	Anywhere in refrigerator. (Keep tightly covered.)	5 days
Dairy Products	Wipe off containers before storing.	
Milk	Milk usually kept in extra tall bottle space. Store opened dried milk in tightly covered jar.	7 days
Milk mixtures		Until used.
Cheese	Store in special cheese keeper or tightly wrapped to prevent loss of moisture.	5 days
Cottage		
Cheddar		
Cream		
Leftover	Meat, poultry, fish, broths, and gravies, etc., covered, with good circulation of air around them.	Use as quickly as possible.
Foods prepared ahead of time	Salad ingredients, salad dressings, puddings, custards, cream fillings, and similar foods—on refrigerator shelf immediately after they have been cooked.	Use as quickly as possible.
Frozen	Store immediately in frozen storage compartment or in freezer. Do not refreeze these foods once they have been thawed.	
Dried foods	Keep in tightly covered jar at room temperature not above 70°F. For best protection, move to refrigerator in warm, humid weather.	

Canned	Once opened, cans of a soup, vegetables, fruits, fish, meat, and poultry must be stored in refrigerator. Open jars of salad dressing must not be frozen, but should be kept in refrigerator.

ACTIVITIES

1. Discuss the ways of improving the present method of using the refrigerator in your own home and in the laboratory.
2. Demonstrate the proper use of the refrigerator in your laboratory. Assign a narrator to explain where the various foods are to be placed in the refrigerator and why.
3. Explain the principles of a simple ammonia refrigerator system with the aid of a schematic diagram.
4. Determine the flow of cold air and proper food placement in an ice refrigerator (an insulated cabinet whose operation depends entirely on the natural consequences of placing a block of ice within a closed cabinet).
5. Know the rules for storing foods at room temperature. Consider the storage of shortenings, milk, cream, cheese, sugars, baked products, staple supplies, and fruits.
6. Tabulate the kinds of food according to shelf life. List the length of storage life, and give examples.

REFERENCES

1. Anonymous, *The Wise Encyclopedia of Cookery* (New York: Wm. H. Wise and Company, Inc., 1954), p. 635-639, p. 1007-1014.
2. Lewis, D., J. Durns, and E. Segner, *Housing and Home Management* (New York: MacMillan Co., 1961), p. 282-286.
3. Lewis D.A., G.C. Peckham and H. S. Hovey. *Family Meals and Hospitality* (New York: MacMillan Co., 1960.)
4. Peck, L. and L.S. Thye, *Household Equipment* (New York: John Wiley and Sons, Inc., 1961), 5th ed.
5. Willan, L. *At Work in the Kitchen.* (Swanton, Penn.: International Textbook Co., 1918)

SECTION FIVE

Freezing of Foods

The seven cardinal rules for freezing are:

1. SELECT RAW MATERIALS CAREFULLY. Only quality products are to be frozen. Slime, molds, and bruises must be trimmed from fruits and vegetables. Only the freshest meat should be frozen.
2. HANDLE CAREFULLY BEFORE FREEZING. Follow the directions for freezing carefully. Freeze foods as soon as possible.
3. PACKAGE PROPERLY. Use moisture-vapor-proof paper, foil, or waxed cartons. For solid foods, the type of packaging material recommended is freezer-weight paper such as heavy-duty aluminum foil, cellophane, Pliofilm or other transparent films. Polyethylene bags may also be used. For liquid-packed foods, use heavily-waxed cartons, glass freezer jars, plastic or aluminum containers.
4. FREEZE AT 0°F OR LOWER. Packages should be loosely arranged while freezing. When completely frozen they may be tightly stocked in the freezer.
5. STORE FROZEN FOODS AT 0°F. Palatability and nutritive value of foods are best preserved at 0°F or lower. The storage temperature should not fluctuate above zero, but fluctuation below zero is not serious.
6. HANDLE AND COOK CAREFULLY AFTER FREEZING. Follow directions for cooking. Avoid thawing and rethawing.
7. AVOID LONG STORAGE. Frozen products will not keep indefinitely as there is progressive deterioration even in the frozen state; therefore time of storage should be limited. It is best to plan normal seasonal turnover.

Note to the teacher:

1. Refer to more complete texts on home freezing such as that by H. Meyer on *The Complete Book of Home Freezing.*
2. Try to emphasize the value of the freezer for the housewife in terms again of the four-fold advantages of food preservation, namely: "nutrition, convenience, economy, and variety."
3. To bring out the point of the convenience value of the freezer, it might be interesting for the class to plan a menu and freeze the different foods from soup to dessert.
4. Take a few minutes at the beginning of the laboratory period to

re-emphasize the value of temperature to food preservation. It would not be out of place to bring out the temperature chart again. Then carry on a discussion on how to use and care for a freezer. This can be a lecture or a report by one of the girls. Whatever form it takes, the purpose of the lesson still remains that of making sure the girls get the maximum satisfaction with the minimum effort from their freezer.

5. Discuss these rules on freezing of cooked foods.

TABLE 10. DO'S AND DON'TS ON FREEZING OF COOKED FOODS

These rules are applicable for creamed main dishes, stews, meat with or without gravy, and soup.

A. COOKING MAIN DISHES TO BE FROZEN

1. *Do* cook for shorter time than directed in the recipe. This slight undercooking will help prevent "warmed over" flavor.
2. *Do* cook quickly. To hasten cooking, set covered pan in ice water.
3. *Do* cook macaroni and spaghetti for frozen main dishes until barely tender.

B. STORING

4. *Do* pack solidly to avoid air spaces. Pack gravies and sauces with meat and vegetables to help fill air spaces.
5. *Do* freeze in a suitable container such as glass freezer jars or aluminum containers. To avoid transfering during reheating, use ovenproof baking dishes or casseroles.
6. *Do* fill jars with rounded shoulders only up to the shoulder. Fill pints to 1/2" from top; fill quarts or larger to 1" from the top.
7. *Do* trim roasted meats such as beef, pork, ham turkey, or chicken before freezing to short freezer space.
8. *Do* cover roasted meat with gravy for prolonged storage life.
9. *Don't* add crumb or cheese topping before freezing; add these just before serving.
10. *Don't* store main dishes without sauce for longer than three months and those with sauce for longer than six months.

C. DEFROSTING

11. *Do* prevent scorching in creamed dishes, stews, creamed soup and dishes by heating in a shoulder boiler 20 to 30 minutes. Partial thawing of frozen foods may help also.
12. *Do* reheat macaroni and spaghetti dishes in oven at 300° for 1 hour.
13. *Do* bake dishes for 45 minutes to 1 hour at temperature from 325° for those with thin sauces and 400° for those with large chunks of food.
14. *Do* heat in saucepan with small amount of liquid or fat until bubbly.
15. *Don't* stir vigorously while reheating. Mix gently to prevent mashing of foods.

LABORATORY PROBLEM 10 Freezing of Fruits

HOW TO FREEZE FRUITS

1. Prepare the fruits.

   Most fruits are frozen immediately after harvest. Some may need a short ripening period preliminary to freezing. Wash the fruits and in general prepare them for freezing as for serving.

2. Pack the fruits.

   Three ways are given for packing fruits whole or in pieces:

   a. sirup pack—generally best for dessert purposes, use 1/2 to 2/3 cup of sirup for each pint package of fruit. Prepare sirups according to Table 11.

TABLE 11. SIRUPS TO USE FOR PACKING FRUITS FOR FREEZING

TYPE OF SIRUP	SUGAR (CUPS)	WATER (CUPS)	YIELD OF SIRUP (CUPS)
30-percent sirup	2	4	5
35-percent sirup	2 1/2	4	5 1/3
40-percent sirup	3	4	5 1/2
50-percent sirup	4 3/4	4	6 1/2
60-percent sirup	7	4	7 3/4
65-percent sirup	8 3/4	4	8 2/3

Note:

In general, up to one-fourth of the sugar may be replaced by corn sirup. A larger proportion of corn sirup may be used if a very bland, light-colored type is selected.

Use the lighter sirup for the mild flavored fruits to prevent masking of flavor; use the heavier sirups for very sour fruits. 40% sirup is recommended for most fruits.

Be sure sirup covers the fruit. To keep the fruits down, place a small piece of crumpled parchment paper or other water-resistant wrapping material on top and press fruit into sirup before closing and sealing container.

b. Sugar pack — best for cooking purpose because there is less liquid in the product, put dry sugar on fruit. Mix gently until the juice is drawn out and the sugar dissolved. Keep fruits below sirup by placing a small piece of crumpled parchment paper or other water-resistant wrapping material on top and press fruit into sirup. Seal container.

c. Unsweetened pack — best for cooking purposes and may be required for special diets. Pack fruits without adding anything or pack fruits in its own juice. Pack fruits without or with water containing ascorbic acid. Press fruits down as in b.

To prevent browning, use 1/4 teaspoon of citric acid to 1 quart of water or 1/4 teaspoon of ascorbic acid to each 1 or 1 1/2 cups of sirup.

FROZEN FRUIT COCKTAIL

Assemble these utensils:

2-quart saucepan
set of measuring cups
set of measuring spoons
kitchen knife (stainless steel)
3 2-quart utility bowls
3 plastic bags or 2 ordinary plastic refrigerator dishes or aluminum foil
chopping board

Assemble these supplies:

1 small papaya (just ripe)
1 small pineapple (firm fully ripe)
3 medium mangoes (firm fully ripe, or any other fruit combination)
2 cups sugar
4 cups water

Steps in preparation:

1. Cube papaya, cut pineapple into chunks and scoop mangoes with stainless steel knife.
2. Mix together and pack in containers.
3. Cover with cold syrup by dissolving 2 cups sugar in 4 cups water. Leave headspace.
4. Seal and freeze.

Yield: 20 to 30 servings

Evaluate the product:

Appearance: color — *natural* color (characteristic color of fruit), dull, faded
shape — disintegrated, *whole,* mushy, shrunken, shriveled
Texture: hard, *firm,* smooth, *tender,* fibrous, soft, mush, lumpy
Palatability: *characteristic flavor of fruit,* flat, sour, tasteless, too sweet, off-flavor

FROZEN PINEAPPLE

Assemble these utensils:

kitchen knife
2-quart saucepan
set of measuring cups
utility bowl
2 plastic bags or 2 ordinary plastic refrigerator dishes
chopping board

Assemble these supplies:

1 medium pineapple (firm, fully ripe)
2 cups sugar
4 cups water

Steps in preparation:

1. Select firm, ripe pineapple with full flavor and aroma.
2. Pare and remove core and eyes.
3. Slice, dice, crush, or cut the pineapple into wedges or sticks.
4. For unsweetened pack—pack fruit tightly into containers. Cover without sugar.

   For sirup pack—pack fruit tightly into containers. Cover with 30% sirup made by dissolving 2 cups sugar in 4 cups water or pineapple juice if available.
5. Seal and freeze.

Yield: 12 to 15 servings.

FROZEN PAPAYA BALLS

Assemble these utensils:

set of measuring cups
kitchen knife
fruit scoop
utility bowl
chopping board
saucepan
strainer
2 refrigerator dishes, polyethylene bags or aluminum foil

Assemble these supplies:

1 small papaya (just ripe, fresh, firm)
1 cup sugar
2 cups water

Steps in preparation:

1. Wash, pare, remove seeds, and scoop papaya.
2. Pack into containers and pour cold 30% sirup by dissolving 1 cup sugar and 2 cups water. (Strain sirup before pouring in containers.)

Yield: 8 to 10 servings.

Just a little hint:

Serve frozen fruits topped with custard dressing or whipped cream.

FROZEN MELON — CANTALOUPE, HONEYDEW, WATERMELON

A colorful cocktail which is nice as such or which can be further enhanced by the judicious addition of lemon, orange, or *kalamansi* juice or a pinch of citric acid.

Assemble these utensils:

2-quart saucepan
set of measuring cups
kitchen knife
chopping board
2 2-quart utility bowls
2 ordinary refrigerator dishes or polyethylene bags or aluminum foil
fruit scooper
fruit chopper

Assemble these supplies:

1 medium firm-fleshed, well-colored and ripe melon
2 cups sugar
4 cups water

Steps in preparation:

1. Slices, cubes or balls
   - a. Wash, cut in half, remove seeds.
   - b. Cut into slices, cubes or balls.
   - c. Pack into containers and cover with cold 30-percent sirup by dissolving 2 cups sugar in 4 cups water. Leave headspace.
   - d. Seal and freeze.
2. Crushed
   - a. Wash, cut in half, remove seeds.
   - b. Crush them with a food chopper or knife. A melon grater can also be used.
   - c. Add 1 tablespoon sugar to each quart of crushed fruit if desired. Stir until sugar is dissolved.
   - d. Pack melon into container, leaving headspace.
   - e. Seal and freeze.

LABORATORY PROBLEM 11 Freezing of Vegetables

Freeze fresh, tender vegetables right from the garden. Wash and sort vegetables according to size for heating and packing. Blanch vegetables either in boiling water or steam. To heat in boiling water, use a large kettle that can be covered and into which a fine-mesh wire basket fits; or use a blancher which has a blanching basket and cover.

For each pound of prepared vegetable use at least 1 gallon of boiling water in the blancher or kettle. Put vegetables in blanching basket or wire basket and lower into the boiling water. Put lid on blancher or kettle and start counting time immediately. Keep heat high for time given in directions for vegetable for freezing.

To steam, use a kettle with a tight lid and a rack that holds a steaming basket at least 3 inches above the bottom of the kettle. Put an inch or two of water in the kettle and bring the water to a boil.

Put vegetables in the basket in a single layer so that steam reaches all parts quickly. Cover the kettle and keep heat high. Start counting steaming time as soon as the lid is on.

Cool vegetables immediately after heating.

Freezing beans, snap, green, or wax

1. Select young tender stringless beans that snap when broken. Allow 2/3 to 1 pound of fresh beans for 1 pint frozen.
2. Cut beans into 1 or 2 inch pieces.
3. Put beans in blanching basket, lower basket into boiling water, and cover. Heat for 3 minutes. Keep heat high under the water.
4. Plunge basket of heated beans into cold water to stop the cooking. It takes about as long to cool vegetables as to heat them. When beans are cool, remove them from water and drain.

5. Pack the beans into bags or other containers. A stand to hold the bags makes filling easier. A funnel helps keep the sealing edges clean.
6. Leave 1/2 inch headspace and seal by twisting and folding back top of bag and tying with a string. Freeze at once. Store at 0°F or below. If the bags used are of materials that become brittle at low temperatures, they need an outside carton for protection.

Evaluate the product:

Appearance: color — *attractive, good color,* discolored, dull, pale, muddy.
shape—*regular and uniform pieces,* irregular, broken, disintegrated, mushy.

Texture: *tender,* soft, mushy, slightly *crisp,* crisp, very crisp, *even texture,* hard, woody, shrivelled.

Palatability: *characteristic flavor,* raw, strong burned, no flavor, *well-seasoned,* spicy, salty.

FROZEN GREEN BEANS

Assemble these utensils:

saucepan
utility bowl
tongs
kitchen knife
chopping board
2-quart utility plate
blanching basket
2-3 polyethylene bags

Assemble these supplies:

1 pound green beans (*sitaw or habichuelas*)

Steps in preparation:

1. Select young tender stringless beans that snap when broken.
2. Cut beans into 1 or 2 inch pieces.
3. Put beans in blanching basket, lower basket into boiling water, and cover. Heat for three minutes.
4. Plunge basket of heated beans into cold water to stop the cooking. Cool for three minutes. Remove from water and drain.
5. Pack the beans into bags. (A stand to hold the bags make filling easier. A funnel helps keep the sealing edges clean.)
6. Leave 1/2 inch headspaces and seal by twisting and folding back top of bag and tying with a string.
7. Freeze at once. Store at 0°F or below.

Note: If the bags used are materials that become brittle at low temperature, they need an outside carton for protection.

Here is a little hint:

Saute the frozen beans with *guisado* mix found in the section on canning.

FROZEN CREAM-STYLE SWEET CORN

Assemble these utensils:

kitchen knife
chopping board
utility bowl
saucepan

aluminum foil or polyethylene bags

Supply:

6 fresh, medium size fresh corn

Steps in preparation:

1. Select ears with plump, tender kernels and thin, sweet milk.
2. Husk ears, remove silk, and wash the corn. Heat ears in boiling water for 4 minutes. Cool promptly in cold water and drain.
3. Cut corn from the cob at about the center of the kernels. Scrape the cobs with the back of the knife to remove the juice and the heart of the kernel.
4. Pack corn into containers, leaving 1/2 inch headspace. Seal and freeze.

Hints:

1. You can successfully can the frozen sweet corn by following the brief and simple steps of canning sweet corn in the canning section.
2. Cook the corn further until tender, cool completely.
3. Serve with cream or milk and crushed ice.

REFERENCES

1. Anonymous, "Home Storage of Fruits and Vegetables." *Farmers Bulletin* (Washington, D.C. Department of Agriculture, U.S. Government Printing Office, 1939).
2. Gortner, W.D., *Principles of Food Freezing* (New York: John Wiley and Sons).
3. Lewis, D.A., G.C. Peckham, and H.S. Hovey, *Family Meals and Hospitality* (New York: MacMillan Co., 1960).
4. Tressler, D.K. and C.P. Evers, *The Freezing Preservation of Foods*, (Avi Publishing Co., Westport, Conn., 1957.)
5. Tressler, D.K., C.P. Evers and B. Evers, *Into the Freezer and Out* (Connecticut: Avi Publishing Co., Inc., Westport, 1953).

LABORATORY PROBLEM 12 Freezing of Fish

To lessen your marketing trips, try freezing fishes, too.

Assemble these utensils:

2-quart utility bowl
chopping board
kitchen knife
aluminum foil or polyethylene bags

Assemble these supplies:

1 medium size fish (*bangus, apahap, lababita* or *besugo*)

Steps in preparation:

1. Scale, dress, remove head and wash.
2. Trim fins and tail if fish is small and to be frozen whole.
3. Cut large fish into pan-ready steaks or boneless strips if desired.
4. Wrap in moisture-vapor proof paper.
5. Freeze promptly.
6. Store at 0°F.

Helpful hints:

1. Fish may be glazed and frozen unwrapped. Renew glaze if necessary every 1 to 3 months.
2. Defrost frozen fish. Defrosting

may be done in the refrigerator, at room temperature, or in front of an electric fan, if speed is necessary. Defrosting in the refrigerator is preferable because the fish will be more tender and juicy.

3. Cook immediately after defrosting and leave fish in its wrapping until ready to cook. Use lower heat for broiling, pan-broiling or pan frying than for fresh fish to prevent drying out or scorching during the longer cooking period.
4. Test for doneness. Fish is done when it is opaque throughout. Flesh "flakes" and is tender when tested with a fork.

Evaluate the product:

Appearance: color — *golden brown,* dark brown, pale, burned, *attractive.*
outside — dry, soggy, *moist.*
inside — *moist,* dry, crumbly, carelessly served, overgarnished.

Texture: *tender,* soft, mush, hard, tough, *flaky,* solid, compact.

Palatability: *characteristic fishy flavor,* very fishy, stale, *well-seasoned,* salty, flat.

LABORATORY PROBLEM 13 Freezing of Meats

This is especially helpful when the family decides to buy meats in quantity.

Assemble these utensils:
- kitchen knife
- chopping board
- 2-quart utility bowl
- aluminum foil or polyethlene bags

Supply:
- 1 kilo meat (beef, pork, lamb)

Steps in preparation:
1. Select sound, high-quality meat.
2. Chill promptly and thoroughly to below 40°F.
3. In cutting, separate steaks from roasts; pot roasts from stew meat and from meat to be ground. Fat should be ground.
4. Package in quantities that you wish to cook at one time.
5. Wrap carefully with vapor-resistant packaging material to prevent drying.
   a. Pull paper tight to drive out air; make packages smooth to pack together snugly.
   b. Seal seam with a fold.
   c. Fold or twist ends. Tape ends and seams.
   d. Wrap cuts; package ground meat in cartons or bags.
6. Freeze quickly at zero or lower.
7. Store at 0°F.

Yield: 8 to 10 servings.

A word to the wise:

When wrapping paper is short use melted lard.

a. Freeze steaks or chops, roasts and blocks of stew or ground meat unwrapped.
b. Dip each frozen piece briefly (5 seconds) in fresh lard, heated to 200°F.
c. Let this lard film set on frozen meat. Lard wrapped meat will resist drying for 6-12 months freezer storage.

LABORATORY PROBLEM 14 Freezing of Poultry

Assemble these utensils:

4-quart saucepan
sharp kitchen knife
chopping board
2 utility bowls
aluminum foil or polyethylene bags

Supply:

1 medium size chicken

Steps in preparation:

1. Dress, draw, and chill bird.
    a. In preparing to pick chickens, avoid overscalding the skin. Use water about 128° to 140°F.
    b. Tie roasters compactly.
    c. Unjoint or cut up fryers.
    d. Split broilers.
2. Wrap in moisture-vapor-resistant paper.
3. Freeze promptly.
4. Store at 0°F.

Helpful hints:

Chickens may be ice glazed and frozen unwrapped as fish and meat.

REFERENCES

1. Burr, H. and R. Paul Elliot. 1960. *Quality and Safety in Frozen Foods,"* Journal of American Medical Association 174(9):1178-1180.
2. Dickenson, D. and W. Raves, *Canning and Freezing Fruits and Vegetables,* Food Manuf. 37(7): 334-36.
3. Griswold, Ruth, *The Experimental Study of Foods* (New York Hougton Mifflin Co., 1962)
4. Meyer, H., *The Complete Book of Home Freezing,* revised edition, (Philadelphia, Lippincott Company, 1959.)
5. Research and Home Economics Division. 1959, *10 Short Lessons in Canning and Freezing.* Kerr Glass Manufacturing Corporation.
6. Tinklin, G. "Freezing Foods." Agricultural Experiment Station. Kansas State University of Agriculture and Applied Science, *Bulletin* 464.
7. Trissler, Donald, *The Freezing Preservation of Foods*. Vol. I and II, 3rd completely revised and augmented ed. The Avi Publishing Co., Inc., Westport, Conn.
8. Walker, G. C. 1964. "Color Determination in Frozen Beans: The Effect of Blanching." *Journal of Food Science.* 29(4):389

SECTION SIX

Salting, Drying, and Smoking

Salting, drying, and smoking have been known for centuries and yet remain ever new. Today, for example, freeze-drying has come to fore, presenting a novel way of preserving the food at its prime quality. In the home, even in the absence of fancy equipment, this method provides distinct advantages.

Dried foods require less storage space than other types of food considering that the great percentage of moisture present in most foods is reduced in the dehydrated form. The bulk is reduced to 1/9 to 1/4 of the original.

Dried foods weigh much less than its equivalent amount of canned product.

Dried foods can be preserved without the addition of sugar or any preserving medium.

Note to the teacher:

In case there are no driers or evaporators available, it might be well to have one constructed. See the section on "How to Construct Evaporators."

Although the advantages of drying are to be discussed extensively in the lecture, it is not amiss to repeat these in the laboratory. The students may be asked to bring samples of dried foods and to discuss the methods of packaging dried foods.

Ask the students to answer the questionnaire on this section at the end of the manual.

HOW TO CONSTRUCT EVAPORATORS

In his book on how to preserve foods, W. W. Chenoweth offers the following suggestions for the construction of evaporators:

THE OVEN. The oven offers the most economical means of evaporating fruits and vegetables in the home. When properly manipulated the oven will turn out high-grade products in quantity sufficient for ordinary family requirements. As a rule, trays are the most desirable receptacles for the prepared materials. These may be made from the fine-meshed (1/4-inch) cellar-window wire, which may be purchased from the hardware dealer. This wire is cut into pieces about 2 inches larger each way than the dimensions of the oven (depth, and width). The extra width is bent over and back upon the sheet to a width of 1 inch on all four sides. This reduces the sheet of wire mesh to the size of the oven and the inch of bent-over wire acts as a reenforcing along the sides and ends which give the sheet a measure of rigidity. Or a fine-mesh screen wire of of bronze or galvanized iron, if available at the hardware store, may be cut to size to fit the shelves or racks which are a part of the oven equipment.

In using the oven as an evaporator, the door must be left ajar so that the warm moist air can escape and cooler air enter, which in turn becomes heated and dried, and which then may take up its load of moisture from the drying materials. This constant circulation of warm air so essential to proper evaporation of foods cannot take place in the oven unless the door is partially open. An occasional rearrangement of the trays will generally be necessary in order to secure uniform drying throughout the oven.

All types of ovens may be used, though some are more desirable than others. The portable oven is very good since its construction is almost identical with that of the ordinary type of kitchen-range evaporator, except that no provision is made for the ready escape of the warm moist air. When it is used for drying the door must be left slightly open. A little experience in oven evaporation will enable anyone to operate the oven successfully in such manner as to produce high-grade evaporated foods. A thermometer with bulb about midway between front and back of the bottom tray will enable the operator to keep a check on the temperature of the materials being evaporated. It should be removed and quickly read at half-hour intervals.

THE WATER TANK TYPE. This is a very satisfactory piece of equipment for home evaporation. It requires least attention of all and gives very uniform and satisfactory results: It may be constructed of tin plate or galvanized sheet iron and may be made in size to suit the convenience or demands made upon it. It is a rectangular metal box in which there is a single opening, about 1 inch in diameter, in one corner. The top is set in about 3/4 inch from the top of the sides and ends. A small size is about 16 inches wide, 30 inches long, and 3 inches deep.

This evaporator is operated by filling it about half full of water. It may be placed over the range or the end away from the hole in the top may be placed over the flame of the oil burner or gas plate. The prepared materials are distributed over the top in a uniformly thin layer. As the water becomes heated, it circulates throughout the entire volume which gives a fairly uniform temperature to the entire top surface upon which the materials rest. The opening in the corner allows the vapor to escape and is used for filling and emptying the water into and from the evaporator. The temperature of the water should be kept just below the finish temperature.

A single or double layer of cheesecloth placed on the drying surface of this evaporator under the materials add to its efficiency and is a great aid in handling the finished products.

If products are dehydrated in small lots of a few pounds the homemaker may well substitute the double-pan drier for the above type. The lower pan should be deep and rather narrow. The upper pan should be wide and very shallow. A cake tin or cookie sheet may be used in place of the upper pan. Water is placed in the lower pan and the materials to be dried are spread thinly over the bottom of the upper pan. Heat is applied to bring the temperature of the water to 150°F. The source of heat may be an electric range, gas or oil flame. This makeshift evaporator will be found satisfactory for small lots.

A HOMEMADE EVAPORATOR

The evaporator described here may be built at small expense by any one who can handle tools and has access to a small shop from which the necessary lumber may be purchased.

The evaporator consists of an enclosed cabinet with runways for trays and may be larger or smaller than the one described here. The cabinet proper is 13-1/4 inches wide, 20 inches deep, and 25 inches high. The length of the legs is determined by the kind of heating unit used. On a flat surface such as an electric or gas range the legs project 1 inch below the bottom of the cabinet. If used over a coal or wood range the lower four inches of the legs should be of small bolts screwed into hole in lower end of legs or a piece of strap metal may be screwed to the side of the leg to give at least three or four inches of metal above the stove.

If a gas plate or small oil burner heater is used, the length of the legs should be such as to bring the side walls 1 to 2 inches above the heater.

OPERATING THE EVAPORATOR

Cut pieces of cheesecloth of size to fit over the screen bottom of the trays.

Place the evaporator over the heater so that the heat spreader is 3 inches above the surface of the heater. Place a thermometer through a hole in the right side wall so that the bulb is one inch below the bottom of the tray and about 6 inches from the rear wall. The bulb should be at least 6 inches inside the chamber.

Place the trays in position, start the heater, and experiment to determine if you can control the temperature of the air entering the evaporator at 130°, 150°, and 165°F. If the heat cannot be lowered sufficiently to maintain the proper temperature, the evaporator must be raised one or two inches above the heating surface.

Place the prepared materials on the trays as directed for each kind. Place the trays in the evaporator as follows:

The bottom tray is left flush with the door, the second tray is pushed in until the entering end rests against the near wall. Continue in same manner with the remaining trays. This position of the trays provides better distribution of the dry warm air over the materials, thereby giving more rapid and uniform drying. It is not necessary that all the trays be loaded.

The temperature of the air entering the evaporating chamber may be 160° to 175°F, during the first 1 to 1 1/2 hours. Then the heat should be reduced so that the temperature is not above that recommended for that material during the remainder of the dehydration period.

Occasional shifting of the upper and lower trays is necessary to insure uniform drying.

The drying of foods, usually fruits and vegetables, constitutes one of the oldest and most important food industries. Countries of Asia minor, Spain, Greece, Italy and others in the Mediterranean produce most of the world's supply of sun-dried fruits. The Philippines is importing a large amount of dried foods from Japan and indirectly from the China mainland. (Mendoza, 1961) People nowadays enjoy the convenience of instant coffee, soup and more recently, dried tea. Only a small amount of storage is needed for dried foods because their bulk is at least from 1/9 to 1/4 less than that of the fresh foods, processing equipment is limited and dehydration requires the least amount of labor and money among the different types of food.

General Methods Used in Drying

a. Sunshine — The material is usually sliced and spread on a tray or a mat and exposed to the sun to dry.

b. Artificial Heat — The material is dried by exposure to hot air in an oven or in a specially constructed drier.

c. Air Blast — The food is dried by means of fan driven by electricity, kerosene, or alcohol. This method requires about 24 hours for drying, a few hours for drying vegetables not very rich in water content.

The moisture content of a substance when reduced below 10% will inhibit the growth of micro-organisms. All organisms require food for growth and development and before the food is available to them it must be in a solution which is rather detected. These micro-organisms obtain food by osmotic action.

Drying foods imply concentration to such a point that the liquid is denser than the body fluid of the organism. When the liquid outside the cell wall is more dense than that inside, the liquid within tends to be removed from the cell and body processes are delayed or prevented. Drying may also retard enzyme action.

Factors affecting dehydration of food are as follows:

1. Temperature—the temperature is directly proportional to the rate of evaporation. The best temperature for drying is 110-150°F. Exact temperature, however, depends on the nature of the food. As the temperature of the food approaches the boiling point of water, the fluids in the food expand, break the cell walls of the food and escape, thus losing some of the soluble substance and some of the flavor of the food. Caramelization of sugar and development of scorched flavor and discoloration can also occur. High temperature may also actually hinder evaporation by forming a hard dry layer out of the surface of the food and thus preventing the circulation of water from the interior to the surface.

2. Time — the length of time of drying is directly proportional to the dryness of the product, unless there is fluctuation in atmospheric conditions. The quality of food

is best maintained by rapid drying. Any condition favorable to the evaporation of moisture like circulation of air tends to hasten the drying of food.

3. Velocity of air—the velocity of the air is directly proportional to the transfer of heat from the food to the environment.
4. Relative humidity of air—the less saturated the air is with moisture, the faster is its absorption of water vapor from the food.

Drying like any other method faces some fundamental problems like loss of nutrients, flavor deterioration, discoloration and too much time involved. The protein, carbohydrates, fats, and minerals are practically unchanged during the drying process but the vitamins, especially vitamin C and other water soluble vitamins are adversely affected. The conventional hot-drying method limits its application to only a few food items.

REFERENCES

1. Desrosier, Norman W., *The Technology of Food Preservation.* Rev. ed. Connecticut: (The Avi Publishing Co., Inc., 1963), p. 252.
2. Frazier, William C. *Food Microbiology* (New York: Hill Co., Inc., 1958) p. 126-131.
3. Justin, Rust and Vail, *Introductory Foods* (Boston: Houghton Mifflin Co.), p. 519-536; 586-598.
4. Mendoza, Jose. *Philippine Foods, Their Processing and Manufacture* (Printed in the Philippines, 1961). p. 161.
5. Sweetman, M.D. and Mackellar, *Food Selection and Preparation,* (New York: John Wiley and Sons), p. 158-175.
6. Von Loeseck, Harry W., *Drying and Dehydration of Foods* (London Reinhold Publishing Co.

IMPORTANCE OF SMOKING

Smoke as such has very little preservative action. Done properly, it does make a product look better; in many cases, it adds a distinctive flavor and an attractive color.

Generally speaking, there are two types of smoking: hot and cold. Hot-smoking is, indeed, a slow type of broiling, where the product is put in close proximity to the fire and the food is cooked as well as saturated with smoke. Another term for hot-smoking is "barbecue smoking." Products receiving this treatment are quite flavorous and juicy, but they have a short storage life unless kept under refrigeration, because the moisture content of meat and fish is high.

In cold-smoking, temperatures of 90° to 110°F are used in contrast to the 150° to 190°F temperature of hot-smoking. It is true that foods may be cold-smoked for just a few hours and have even a shorter storage life than hot-smoked products, but usually cold-smoked products are subjected to low-temperature smoke over a period of days or weeks during which time the food not only picks up a strong smoke flavor but is decidedly dehydrated as well.

Not all smoked foods stand up over

a long period of time, but if the moisture content of the food has been lowered sufficiently and if the salt content has been built up high enough the food will stay good for a long time. However, the smoke itself helps but little in preserving the product.

IMPROVISED SMOKEHOUSE

In general, a smokehouse should be a fairly airtight container into which smoke can be introduced. A pot, box, barrel, or shed, in which trays, rods, or hooks can be placed for holding the food, will serve. Either the house or the source of smoke should be movable so that the smoke can enter hot or can be allowed to cool before entering.

Secure two large bottomless barrels welded end to end to have a smoking chamber at least 7-10 feet high. Set this on a stove at ground level. For cured meat hang on a grill at top end keeping the meat at least 3-5 feet from the heat. Use non-resinous fuel (guava leaves have been satisfactorily used in the laboratory). Do not allow to ignite or the meat will get cooked. If a dial thermometer is inserted into the side of the barrel 1/3 off the top end, the temperature may be checked. Keep the temperature at 90-110°F. Smoke for 2 to 3 hours, depending on the food smoked, repeating the process until a nice color and odor are imparted.

LABORATORY PROBLEM 15 Salting of Eggs

SALTED DUCKS' EGGS

Observe the color of the yolk of the salted ducks' eggs with difference in length of time of salting.

Assemble these utensils:

- salometer
- 250 ml. graduated cylinder
- wide mounted jar
- 4-quart saucepan
- set of measuring cups
- slants for weighing down eggs in the brine solution

Assemble these supplies:

- 1 dozen ducks' eggs (preferably 8 days old)
- coarse salt

Steps in preparation:

1. Prepare a saturated salt solution with hot water. Strain.
2. Test the salt concentration with a salinometer before adding the eggs. In the absence of a salinometer, test the salt concentration by floating a fresh egg. It should float and show an area the size of a fifty centavo coin above the brine.
3. Keep the eggs thoroughly immersed in the solution by placing a square of four thicknesses of wax paper on the surface of the brine and weighing down with a saucer.
4. Test the salt concentration everyday until a constant reading is obtained. It takes about 3 or 4 days to attain this.
5. Record the number of days it takes to attain a constant reading. Graph your reading.

6. Hard cook one egg for future sampling. Remove another from the salt solution, coat with paraffin and store in the refrigerator until the others are ready for sampling.
7. Remove two eggs after one week. Take the eggs and treat as in 7. Check salometer readings.
8. Repeat (7) after two weeks.
9. Repeat (7) after three weeks.
10. Remove paraffin from samples and hard cook all eggs together below boiling point for 15 minutes.
11. Compare eggs for palatability. Note differences in saltiness, consistency of yolk and white.

Evaluate the product:

Appearance: yolk — *reddish orange,* oily, dull yellow
white — *white,* grayish-white, off-white

Texture: *tender,* tough, *delicate,* solid, firm

Consistency: *firm,* gel-like, watery, partially cooked, tough, overcooked, watery inside

Palatability: *Pleasingly salty,* extremely salty, bitter

LABORATORY PROBLEM 16 Salting of Pork

TAPANG BABOY

(*Native Pork "Tapa"*)

Assemble these utensils:
- dietetic scale
- set of measuring spoons
- kitchen knife
- utility plate
- 2 plastic containers or a big refrigerator dish

Assemble these supplies:
- 1 kilo pork (1/2" slices, 5" long)
- 1 tablespoon salt
- 2 tablespoon sugar
- 1/8 teaspoon salitre
- dash of pepper

Steps in preparation:
1. Mix curing ingredients and rub well on the surface of the meat.
2. Place the curing meat in a clean covered container.
3. Keep at room temperature for 2 days.
4. Dry in an improvised drier or under the sun 6 - 8 hours or more.
5. Store in a dry, cool, well-ventilated place free from insects.

Helpful hints:

This can be stored for one month if kept properly.

TUCINO

Salted pork may be eaten for breakfast, lunch, or supper.

Assemble these utensils:
dietetic scale
set of measuring spoons
kitchen knife
chopping board
2 plastic containers or refrigerator dish

Assemble these supplies:
1 kilo pork, cut in 3/4" thick slices, (*casim* or *pigi*)
2 tablespoons salt
4 tablespoons sugar
1/8 teaspoon salitre
achuete (optional)
dash of pepper

Helpful hint:

Steps in preparation:

1. Mix the ingredients together and rub on both sides of the pork.
2. Place the salted pork in a container and cover.
3. Keep at room temperature for 5 days.
4. Wash a little and cook.

Helpful hints:

This preparation will last for 1/2 month.

LABORATORY PROBLEM 17 Drying of Fruits, Vegetables and Meat

CICHARON

These pork cracklings are usually served with vinegar or *burong isda* (fermented fish).

Assemble these utensils:
sharp butcher's knife
ruler
cutting board
2-quart saucepan
kitchen fork
metal or wooden skewer
French fryer or strainer
glass jar with cover
long range or frying thermometer

Assemble these supplies:
1 kilo pork skin without fat (56-60 1" x 8" pieces)
1/4 cup coarse salt
3 cups water
8 cups lard

Steps in preparation:

1. Cut the pork skin into uniform size, 1" x 8" pieces. Use a ruler and a sharp butcher's knife to obtain uniformity.

2. Boil pork skin in water and salt until skins are so soft that they can be pinched and crushed but do not mush up. At this stage the pork skin will also be sticky. Boil gently and cover pan to prevent too much evaporation of water before skin is cooked. Drain.

3. Thread skewer, metal or wooden, through pork skin pieces keeping them apart. Hang and dry under the sun for four days or longer, keeping it indoors at night time. When thoroughly dry the skin is

not sticky, is tough and can be folded in two.

4. Fry the pork skins, four pieces at a time, in deep fat at 350°F in a small diameter saucepan. Fry until tiny blisters appear on the skin or the sides of the skin curl up but do not brown. Remove skin pieces from hot fat and cool. By using a French fryer or a strainer dipped into the fat the skins may be removed easily and drained.
5. Cool lard and soak skins in it for a day. Keep in covered jar.
6. Remove pork skins and heat lard to 400-425°F. Fry until skins are well-puffed. To make skins curl up press a fork in the middle of the pieces during frying. Serve at once.
7. Keep skins soaked in fat as in 5 until ready to fry and serve. Store *cicharon* and fat away from the stove.

Yield: 56-60 1" x 8" pieces.

Evaluate the product:

Appearance: color — *light brown or creamy,* dark brown, pale
shape — *curled,* straight
size — *larger than the original,* same as original, smaller than the original
surface — *well-puffed, large blisters,* not puffed, small blisters
Texture: *crisp,* tough, hard, leathery
Palatability: *pleasingly salty,* flat, very salty, *fresh tasting,* rancid, *not greasy,* greasy

CORN KROEPECK

Another of the crispies developed in the U.P. Foods and Nutrition Laboratory.

Assemble these utensils:

- a cornmeal grinder
- measuring cups
- measuring spoon
- 1-quart mixing bowl
- 8" aluminum pan
- steamer

Assemble these supplies:

- 1 cup cornmeal, ground fine
- 1/2 cup cornstarch
- 1 teaspoon fine salt
- 2 teaspoons monosodium glutamate (vetsin)
- 1 1/4 cup water

Steps in preparation:

1. Mix the ingredients thoroughly.
2. Pour about 1 1/2 tablespoons of the mixture into the container.
3. Steam for at least one minute.
4. Cut into 1" x 2" pieces.
5. Dry in a drier or oven until hard and translucent.
6. Fry in deep fat at 400°F just before serving. (When a 1-inch cube of stale bread 2-3 days old turns light brown in 20 seconds the temperature of the fat is 385-395°F.)

Evaluate the product:

Appearance: color — *light brown,* or *creamy,* dark
shape — *curled,* not curled
Texture: *crisp,* tough, leathery
Palatability: *pleasingly salty,* greasy, fishy, off-flavor.

FISH KROEPECK

See how fish powder can be made into crunchy appetizers.

Assemble these utensils:

measuring cup
measuring spoon
meal grinder
steamer or a boiler or any pan with cover

Assemble these supplies:

2 cups uncooked rice (almost all varieties will do)
2 cups water
2 teaspoons fine salt
6 tablespoons fish powder
2 teaspoons lime solution (prepared by dissolving 1/2 tablespoon lime in 1/4 cup water)

Steps in preparation:

1. Prepare the fish powder from anchovy or *dilis*. Dry unsalted fresh *dilis* in the sun. Dip commercially dried *dilis* in warm water, wash thoroughly to remove the salt then dry in the sun. Grind dried fish to a fine powder. Ordinary meat grinders or even the *almirez* may be used to pulverize the fish in the absence of meal grinders. The powder is the raw fish flour. This may be used in kroepeck as soon as pulverized.

   To remove the fishy odor of raw fish, use a solvent like alcohol. NEVER USE DENATURED OR POISONED ALCOHOL. Press out the solvent from the powder and dry the residue in the sun. The resulting product is called deodorized fish flour.
2. Proceed as in shrimp kroepeck.

SHRIMP KROEPECK

The Bureau of Fisheries presents a delectable way of increasing the protein, calcium and phosphorus content of a basically rice diet—by using inexpensive small shrimps.

Assemble these utensils:

pie pan or similar container
measuring spoon
measuring cup
steamer
trays
grinder

Assemble these supplies:

350 grams cooked shrimp
12 cups rice (*Wagwag*)
15 teaspoons salt
12 teaspoons *apog* or lime (calcium hydroxide)

Steps in preparation:

1. Soak the rice overnight in water.
2. Drain well and grind fine with an equal amount of water and the blanched whole shrimp until a fine and thin paste is obtained.
3. Mix one teaspoon lime (*apog*) and 1/2 cup water. Add this lime solution to the paste and stir well to produce a homogeneous mixture.
4. Transfer a thin layer into a pie plate and cook by steaming for 2 minutes until the mixture is clear or transparent.

5. Cut into appropriate pieces (1 x 2 inches square); transfer to the trays and dry in the sun for six hours until crisp. The use of artificial heat for drying the kroepeck is recommended.
6. Fry in hot oil for serving.

Because of its low moisture content of less than 10 per cent, the dried kroepeck may be stored indefinitely without spoiling.

DRIED SINKAMAS

Assemble these utensils:

vegetable peeler
knife
cloth bag
saucepan
tray

Assemble these supplies:

1 kilo fresh *sinkamas*
coarse salt

Steps in preparation:

1. Peel the *sinkamas* and cut into thin slices to shorten the drying period.
2. Put the prepared material in a cloth bag and dip 3 minutes in a boiling brine solution (made by mixing 1 cup of common coarse salt and 12 cups of water).
3. Spread the vegetables in single layers on the tray and dry in the sun or use artificial drying.
4. Place the dried vegetables in a covered container and store in a dry place.
5. To use, soak the vegetables overnight before cooking for table use. As dried vegetables are almost half-cooked, their cooking period is very much lessened.

UBI FLOUR

Assemble these utensils:

3 trays
timer
paring knife
2 utility bowls

Assemble these supplies:

1 1/2 kilos fresh *ubi*

Steps in preparation:

1. Wash tubers thoroughly under running water to remove dirt and adhering soil.
2. Steam for 45 minutes.
3. Remove skins and spoiled portions.
4. Press through a meat grinder until fine enough and spread evenly to about 1/2 inch thickness on trays.
5. Dry inside the oven set at 200°F. The content of each tray should be turned over every 10 minutes and the position of each tray is changed 3 times during the process of drying. This is done to insure uniform drying of the material.
6. Dry until the *ubi* is brittle or crisp dry. (This will take around 3 1/2 hours.)
7. Store in moisture free bottles with tight covers.

Yield: 340 grams *ubi* flour.

Helpful hints:

A busy housewife can use this readily accessible flour for some native delicacies as pastillas, *kalamay,* ice cream, cookies, pudding, and *puto.*

LABORATORY PROBLEM 18 Smoking of Fish

TINAPANG BANGUS

Golden brown and deliciously salted.

Assemble these utensils:

kitchen knife
chopping board
utility bowl
set of measuring cups
salometer
graduated cylinder
wire or bamboo rack

Assemble these supplies:

2 medium-sized *bangus*
salt
achuete for coloring (optional)

Steps in preparation:

1. Scale and wash fish.
2. Eviscerate fish.
   a. Insert forefinger of one hand or preferably a broad hook or curved knife blade about a third of an inch wide through one gill flap of each fish. By a combined hooking action of the knife and pressure from the thumb holding the knife on the nearer gill, scoop and pull out the gills and all the organs that will follow.
   b. Make a small slit below and between the gills through which is removed as much of the gills, heart, and other viscera as can be hooked out with one motion.
3. Wash fish again and immerse in a 10% brine (1 part salt to 9 parts water) for about an hour to leach out as much of the blood and slime as possible.
4. Put fish into a 60% brine (1 part salt to 5 parts water) from 1 to 6 hours, depending on the size of the fish, and the amount of salt desired on the finished products. Carry out salting process for a longer period if product is to be kept for months.
5. Remove fish from the brine and wash with fresh water (do not soak).
6. Place fish on rod by threading the rod through the gill flap and out the mouth or suspend by strings attached to the head and thence to a rod, or lay on wire or bamboo rack (the latter method leaves marks on the sides of the fish).

7. Hang the fish in the shade with a good breeze blowing on them, or out in the sun. Turn frequently. Dry 1 to 4 hours or until the surface moisture is removed from the fish and a dry skin or pellicle is formed over the surface. (Before hanging, brush fish with *achuete* if desired.)
8. Place the fish in a smokehouse where the temperature is between 90° and 100°F. Smoke for 6 - 8 hours.

Note:

If product is to be used soon (within 2 weeks) the processing is completed at this point, but if it is to be kept for months, it should be shade dried until fairly hard.

Evaluate the product:

Appearance: *shiny golden brown,* pale, *whole,* mushed up
Texture: *firm, moist,* hard, fibrous, dry
Palatability: *well-seasoned,* bland, salty, extremely salty, off-odor

LABORATORY PROBLEM 19 Smoking of Meat

TAPANG BAKA (JERKED BEEF)

This is a favorite breakfast item in Filipino homes, especially when pounded after drying.

Assemble these utensils:

- kitchen scale
- kitchen knife
- chopping board
- measuring spoons
- refrigerator dish
- skewer
- string

Assemble these supplies:

- 1 kilo beef (tender cut from sirloin or round of good quality)
- 1 1/2 tablespoons salt
- 2 tablespoons sugar
- 1/2 teaspoon saltpeter
- 1 teaspoon vetsin (MSG)
- 1/2 teaspoon pounded garlic (optional)
- 1/8 teaspoon ground pepper (optional)

Steps in preparation:

1. Slice the beef 1/8" to 1/4" thick.
2. Combine salt, sugar, and saltpeter.
3. Rub each piece of meat thoroughly and evenly on both sides.
4. Stack meat slices one on top of the other and store in a refrigerator jar or other clean covered container.
5. Store either in a cool place or in a refrigerator for 4 days and dry in a screened place.

(If no refrigeration facilities are available, allow to cure for one day, then hang up to dry in a screened place.)

6. If desired, smoke *tapa*. Smoking 2 - 3 hours at 70 - 75°C dries the *tapa* and imparts interesting flavor.
7. Pack properly and store in a cool dry place or in the refrigerator until ready to use.

Helpful hints:

Be wise—economize!

Tender meat of good quality is always expensive. Less tender cuts may be prepared into *tapa* and make tender product if thoroughly tenderized before frying. Tenderize by soaking or simmering in a little water before frying.

REFERENCES

1. Anonymous, *"Procedure for Fish Kroepeck and Shrimp Kroepeck."* (Bureau of Fisheries Leaflets. Unpublished.)
2. Manoto, H. *"Cicharon, Special Problem."* U.P. College of Home Economics. Unpublished.
3. Riguerra, C., "Ubi Flour." U.P. B.S.F.T. thesis. Unpublished.
4. Von Loeseche, H., *Drying and Dehydration of Foods.* 2nd ed. (New York: Reinhold Publishing Corp., 1955)

SECTION SEVEN

Curing of Fish and Meat

Meat and fish are stars of the show. Considering their importance in the diet: you might wish to try out the different recipes for curing of fish, duck, pork, and beef.

Helpful hints:

The pork preservation chart in the first section as well as the description of the construction of the improvised smokehouse (Section Six) might be helpful in these sets of experiments.

Ask the students to answer the questionnaire on this section at the end of the manual.

LABORATORY PROBLEM 20 Curing of Fish

BURONG ISDA (FERMENTED RICE WITH FISH)

A partner of *cicharon,* fried fish, and boiled eggplant—very flavorful and colorful, too!

Assemble these utensils:

kitchen knife
chopping board
set of measuring cups
set of measuring spoons
glass jar with a cover
2-quart saucepan

Assemble these supplies:

1 mudfish, medium size
1 tablespoon *angkak*
1 cup rice
2 cups water
coarse salt

Steps in preparation:

1. Clean the fish and slice into pieces.
2. Salt all the slices and allow to stand six hours or overnight.
3. Add the water to the rice and cook.
4. Remove the *lugao* (soft cooked rice from the cooking vessel).
5. Pound the *angkak* fine and mix with rice.
6. Mix the fish and rice then place mixture jar with a cover.
7. Let stand for 3 to 5 days at room temperature or until mixture smells sour. (If not to be served immediately, store in the refrigerator.)

Evaluate the product:

Appearance: rice — *bright red,* dull red fish — *whole,* mushy

Texture: rice — soft-cooked, mushy, *free from extraneous matter,* with palay or stones
fish — *tender,* fibrous

Palatability: *very salty*

BAGOONG NA DILIS OR SAPSAP

Assemble these utensils:

1 dietetic scale
2 2-quart utility bowls
1 utility plate
1 big mouthed jar

Assemble these supplies:

3 - 3.5 kilos fish such as anchovies (*dilis*) or slip mouth (*sapsap*)
1 kilo coarse salt

Steps in preparation:

1. Wash fish thoroughly in clean fresh water.
2. Mix salt thoroughly with the fish at the rate of 1 to 3 or 2 to 7 parts by weight.
3. Place fish and salt mixture in a covered earthenware pot. (This will prevent flies from laying eggs in the mixture which may hatch into visible maggots.)
4. Allow to stand 4 weeks to a year to develop the characteristic aroma and flavor brought about by the breakdown of fish proteins.

Helpful hints:

To make *bagoong guisado,* heat 4 tablespoons lard, add 4 cloves of chopped garlic and fry until brown. Add 1/2 cup of bagoong and stir. Add 2 tablespoons of native vinegar and 1 teaspoon of sugar and simmer until done.

Evaluate the product:

Appearance: *brownish red,* bright red, dull red

Texture: *typical of constituents,* filled with shells and other extraneous matter

Palatability: *pleasingly salty,* extremely salty; *clean fishy odor*

DAENG NA BANGUS

Assemble these utensils:

kitchen knife
chopping board
set of measuring cups
set of measuring spoons
basin
waxpaper

Assemble these supplies:

1 bangus (8" to 10" long approximately 500 grams)
1/2 cup vinegar
1 1/2 teaspoon salt
1 teaspoon *toyo* (soysauce)
1 teaspoon peppercorn, pounded
1 tablespoon garlic, pounded

Steps in preparation:

1. Scale fish.
2. Lay fish flat on its side on a board.
3. Slit along the back with a sharp kitchen knife. Work close to the backbone until you reach the belly cavity.

4. Remove the entrails, gills, and body streak along the backbone inside (this is the kidney of the fish and must be removed to reduce fishiness).
5. Rinse fish in running water. Drain. If *bangus* is thick, the side with the backbone may be slit diagonally 1/8" deep four times along the the length.
6. Combine the last five ingredients and let fish stand in this pickling mixture at least five hours or overnight in a cool place.*
7. Drain fish. Dry in a screen place, under the sun. Artificial drying with circulating warm air in an improvised dryer insures fast dry during a rainy day.
8. Wrap with waxpaper and store in a cool place.

FISH SAUSAGE

These "Friday franks" are ideal for Lent or any time of the year.

Assemble these utensils:

kitchen knife
chopping board
4-qt. saucepan
candy thermometer
funnel
utility bowl
2 utility plates
aluminum wire or string
aluminum foil

Steps in preparation:

1. Prepare ground fish.
   a. Remove head, viscera, skin, and bones from the fish.
   b. Cut fish meat into cubes.
   c. Crush the fish cubes in a meat grinder two or three times.
   d. Weigh the edible portion (1 kilo).
2. Mix all the ingredients in an electric mixer at medium speed for 3 minutes.
3. Stuff the sausage mixture into casing by means of a mechanical stuffer or if no stuffer is available, use a funnel and stuff manually. (Don't overpack.)
4. Tie both ends of sausages with an aluminum wire or string.
5. Cook sausages in water of 90°C for one hour.

Assemble these supplies:

1 kilo fresh ground *labajita* flesh (*galunggong, apahap* and *lapu-lapu* can also be used)
2 tablespoons salt
50 grams pork fat
1 teaspoon monosodium glutamate
1 teaspoon sugar
dash of cayenne, paprika and allspice
1/8 black pepper
1/4 teaspoon onion powder
1 1/2 tablespoons cornstarch
2 drops red coloring
2 yards artificial casing

6. Cool sausages in running water for 10 minutes.
7. Cook sausages at 100°C for 1 minute to unrumple casings. Air cool.
8. Store in refrigerator until used. They stay fresh and edible for 3 weeks when stored thus.

Yield: 15 - 20 2" pieces.

Helpful hints:

1. Fish sausage may also be made out of tuna, shark, whale and other cheap species of fish. This would increase the protein intake of low-cost Filipino meal.
2. An alternative method of preparing the fish meat and wash with ice-water for five or six times. Transfer the meat to a cheese bag and press out the water for one.

Evaluate the product:

Appearance: *light pink,* brownish discoloration

Texture: *smooth,* grainy, lumpy; *tender but firm,* slightly tender, tough, rubbery, crumbly, dry

Palatability: *well-seasoned,* salty, flat, spicy

LABORATORY PROBLEM 21 Curing of Poultry Products

PICKLED CHICKEN OR QUAIL EGGS

Assemble these utensils:

4-quart saucepan
2-quart utility bowl
piece of cheesecloth
measuring cup
measuring spoon
utility plate
3 8-ounce glass jars

Assemble these supplies:

12 fresh chicken or 24 quail eggs
1 pint vinegar
2 red pepper pods
1 1/2 teaspoons whole mixed spices
1 tablespoon salt
1 clove garlic

Steps in preparation:

1. Have eggs at room temperature to prevent "cracking" during cooking.
2. Start in cold or boiling water. For *a cold water start,* completely cover eggs in saucepan with cold water. Heat until water boils. Remove from heat. Cover pan. Let stand 2-3 minutes off the heat. For a *boiling water start,* bring water to a boil in a saucepan. With a spoon carefully lower eggs into the water to prevent cracking the shell. Reduce heat.

Keep water simmering until eggs are cooked, about 18-20 minutes for chicken eggs, 5-10 minutes for quail eggs. To keep yolks centered, turn eggs several times.

3. Immediately cool eggs under cold water. This makes eggs easier to handle, eases shelling and stops the cooking. Cracking shells slightly before cooling makes eggs easier to peel.
4. Remove shells and pack carefully in a quart jar.
5. Mix vinegar, salt, pepper pod, and garlic. Immerse spices tied in a spice bag. Simmer for 10 minutes.
6. Pour hot in the jars and cover the eggs completely.
7. Let stand for at least 2 weeks.
8. Keep in a cool place.

Evaluate the product:

Appearance: yolk — *yellow orange,* grayish, blackish
white — *white,* grayish-white, off-white
curing medium — *clear,* grayish, blackish

Texture: *tender,* tough, delicate, *firm,* soft, mushy

Palatability: flat, *well-seasoned,* too sour, too salty, bitter medicinal flavor

DUCK HAM

Assemble these utensils:

kitchen knife
chopping board
liquid measuring cup
measuring spoon
nest of measuring cups

Assemble these supplies:

a good, healthy duck

Sweet Pickle Cure
3 cups of salt
1 cup of brown sugar
1 teaspoon of salitre (saltpeter)
12 glasses of water

Rubbing mixture:
1/2 teaspoon of allspice
1/2 teaspoon black pepper
a few powdered laurel leaves

Steps in preparation:

1. Fast the duck for at least 12 hours and bleed properly.
2. Dress like a chicken:
    a. Cut the jugular vein in the throat at the base of the head. Then hang the bird by the feet to insure thorough bleeding.
    b. Scald the bird with hot water to remove the feathers. Heat the water just below the boiling point to avoid discoloring the flesh or overheating the skin.
    c. Pluck the body and breast feathers and work toward the tail end. Next remove the down feathers by gently rubbing the body with the hands. Take special care not to remove the skin. Remove pinfeathers by using tweezors or by catching them between the thumb and the paring knife.

d. Remove the intestines, lungs, kidney, gizzard and other organs in the body cavity. Wash the bird thoroughly and rinse the inside cavity with cold water. Make sure you remove all the organs inside.

e. Cut off the wings at the base of the wing joints by making an opening as small as possible. (After curing there is not much that can be eaten from the wings.) Cut the neck close to the body and the legs below the knee joints.

f. Wash the bird and drain thoroughly for about 20 minutes. The bird is now ready for curing.

3. Prepare the pickling solution by mixing thoroughly salt, sugar, saltpeter, and water. Boil the solution for 5 minutes and cool it before using. For better results, prepare the pickling solution a day before curing.
4. Cure the bird by soaking it in the pickling solution for 4 days. See that the solution covers the whole bird. Turn the duck every day.
5. On the fifth day, wash the cured bird thoroughly with water and soak it for 20 minutes. Then hang the bird and let it drip for 15 minutes.
6. Rub the body with 1/2 teaspoon of allspice, 1/2 teaspoon of powdered black pepper and a few powdered laurel leaves.
7. Smoke until the bird turns amber in color using the improvised setup described at the beginning of this section.

Helpful hints:

The smoked duck will keep for as long as 12 months. If you have a refrigerator, you can keep it much longer.

To cook the cured duck, here's the suggested recipe:

COOKED CURED DUCK

Assemble these utensils:

liquid measuring cup
nest of measuring cups
measuring spoons

Assemble these supplies:

1 cured duck
2 cups of water
1 cup pineapple juice
1/2 cup brown sugar
1/4 teaspoon ground black pepper
1/4 teaspoon ground cloves
1 teaspoon chopped onion
a few bay leaves

Steps in preparation:

1. Wash the duck.
2. Place it in a kettle, immersing it completely in the mixture above.
3. Boil until tender (usually an hour).
4. Fry until brown all over.

Evaluate the product:

Appearance: *well browned,* burned
Texture: *tender,* tough, fibrous
Palatability: *well blended flavor,* salty, sour, spicy, smoky

LABORATORY PROBLEM 22 Curing of Pork

PICKLED PIG'S FEET

Here is a delightfully different way of serving the hocks.

Assemble these utensils:

- brush
- pressure cooker
- measuring cup
- measuring spoon
- 4-quart utility bowl
- spice bag
- wide-mouthed sterilized jar

Assemble these supplies:

- 2 pig's feet
- 1 tablespoon salt
- water
- 1 1/2 teaspoon mixed spices tied in a cloth bag
- 1/2 cup vinegar
- 2 tablespoons sugar
- 1 pod of hot red pepper, minced

Steps in preparation:

1. Wash and scrub pig's feet clean with a brush.
2. Rinse and put into a pressure cooker with salt to taste or cook in a heavy covered kettle with enough water to cover and salt to taste.
3. Cook until meat falls from the bone. Remove all bones from the meat.
4. Simmer the spice bag in the vinegar for 5 minutes. Remove the spice bag and set the vinegar aside.
5. While the meat is still warm, press into a wide-mouthed sterilized jar. Pour the warm vinegar and add the sugar and the red hot pepper.
6. Store in a cool place.

Evaluate the product:

Appearance: *light brown,* pale, muddy looking whole, disintegrated

Texture: *firm, tender,* soft, mushy hard, tough, solid

Palatability: *well-seasoned,* flat, sour, too salty, bitter, sweet

QUICK CURED SWEET HAM SLICES

Assemble these utensils:

Assemble these supplies:

- 1 kilo of lean pork (liempo or lomo) sliced thinly
- 1/2 teaspoon salitre (saltpeter)
- 3 tablespoons sugar
- 1 teaspoon salt
- 2 tablespoons soy sauce
- dash of pepper

Steps in preparation:

1. Prepare the pickling solution.
2. Keep the slices of pork immersed in the mixture.
3. Store in a refrigerator or in a cool well-ventilated place until ready for use.

Helpful hints:

After 3 days, the pork can be fried and served. Rice can be fried in the curing mixture.

Evaluate the product:

Appearance: *reddish brown,* bright red, brown

Texture: *tender,* fibrous, dry

Palatability: *well-seasoned,* too salty, too sweet, too peppery

BUTIFARA (A SPANISH SAUSAGE)

Assemble these utensils:

- kitchen scale
- measuring cups
- 2-qt. utility bowl
- utility plate
- 2 refrigerator dishes

Assemble these supplies:

- 1 kilo ground pork
- 1/2 tablespoons pepper
- 1 tablespoon salt
- 2 eggs
- 2 tablespoons butter, if desired
- 2 yards pig casing

Steps in preparation:

1. Mix ingredients together throughly and stuff into pig casing. Link 2" long pieces.
2. Store in the refrigerator if not to be served at once.

The presence of eggs in this sausage renders it more perishable than the native sausage.

LONGANISA (NATIVE PORK SAUSAGE)

Assemble these utensils:

- kitchen scale
- sharp kitchen knife
- chopping board
- measuring spoons
- 2-quart mixing bowls
- 2 utility plates

Assemble these supplies:

- 3/4 kilo lean pork
- 1 1/2 tablespoons fine salt
- 1/4 kilo fat
- 1 tablespoon salitre
- 1 teaspoon garlic
- 1 teaspoon black pepper, pounded, from pepper corn
- 2 tablespoons anisado (optional)
- 2 tablespoons native vinegar
- 1 teaspoon vetsin (MSG)
- dash of paprika
- 3 meters pig casing

Steps in preparation:

1. Mix the above ingredients well with the meat.
2. Stuff in pig casing and link from 4 to 5 inches long.
3. Hang to dry in a cool place or at once if desired.

Yield: 23 pieces 5 inches long.

Evaluate the product:

Appearance: color — *pinkish,* slightly gray, gray, greenish discoloration, *well-browned,* slightly browned, burned, pale

Texture: *medium ground,* finely ground, coarsely ground, *tender,* tough, mushy

Palatability: flat, *well-seasoned,* too spicy, salty, bitter *pleasing mixture of lean and fat,* excessively fatty, excessively lean.

ORDINARY BACON

Assemble these utensils:
- covered dish
- measuring spoons

Assemble these supplies:
- 1 kilo liempo (side or belly of the pork)
- 2 tablespoons salt
- 2 tablespoons sugar
- 1 teaspoon saltpeter
- 1 teaspoon vetsin (MSG)
- 1/2 teaspoon cloves, pounded

Steps in preparation:
1. Cure pieces of meat not more than 2 kilogram or cure as slices in the absence of refrigeration facilities.
2. Combine salt, sugar, saltpeter, and clove.
3. Rub over all surface of the meat.
4. Store in a covered dish in a refrigeration for at least four days or preferably one week.
5. Wash and smoke from 2 to 3 hours at 70-75° C or till the surface of the pork gets tanned.
6. Store in the freezer.

Helpful hints:

To cook small amounts of bacon, pan-fry bacon. Place the strips in a cold frying pan over medium heat. When a strip has turned slightly opaque and yellow turn to the other side. Drain on absorbent paper when fried.

Try broiling for a moderate amount of bacon. Place slices on the broiler rack 3 inches away from a preheated broiler. Broil for 2 1/2 minutes on each side.

To cook a large amount of bacon, bake bacon strips on a rack in a shallow pan, not letting them overlap. Bake in moderately hot oven 400°F about 10 minutes or until crisp. Do not turn. This method does not even need draining.

Evaluate the product:
- Appearance: *flat,* curly, *crisp,* dry surface, *free from excessive fat,* fatty
- Texture: *crisp,* leathery, tough, *pliable*
- Palatability: *pleasing flavor,* salty, bitter, sour, rancid, flat

CANADIAN BACON
(*Cured Smoked Boneless Pork Loin*)

Thinly sliced Canadian bacon can double up for ham for a tasty breakfast.

Assemble these utensils:
- kitchen scale
- measuring spoons
- chopping board
- kitchen knife
- utility plate
- refrigerator dish

Assemble these supplies:
- 1 kilo boneless pork chop with 1/4" thick fat
- 1 1/2 teaspoons salt
- 2 teaspoons sugar
- 1 teaspoon saltpeter
- 1 teaspoon vetsin (MSG)
- 1/2 teaspoon cloves, pounded

Steps in preparation:

1. Combine salt, sugar, saltpeter, and cloves.
2. Rub over all surfaces of the pork roll.
3. Roll up whole pork chop and tie up around and around the length of the piece for the shapely cured product.
4. Store in a covered dish in a refrigerator for at least four days but preferably for one week.
5. Wash and smoke from 2 to 3 hours at 70 - 75°C or till the surface of the pork gets tanned.

Helpful hints:

To make smoking less tedious, have several rolls or a combination of cured meat products to smoke one time to make the trouble of smoking pay.

To have a tasty breakfast, freeze the Canadian bacon and slice thinly in a mechanical slicer. Allow 2 to 4 ounces for each serving. Pan fry or broil.

To make a satisfactory substitute for ham, cook whole roll in a covered pan lined with a rack. Place 1/2 cup crushed pineapple on the surface of the roll. Steam with 1/2 to 1 cup of water over medium heat for 40 minutes to 1 hour. If water remains after bacon is cooked and tender, add 1/2 cup brown sugar. Boil to a thick sirup and use as a glaze of the cooked bacon.

To vary the glaze for Canadian bacon cooked whole, roast like ham and add one of the following glaze as for ham in the last 15 minutes.

(a) 1/2 cup brown sugar, 1/2 tablespoon dry mustard.

(b) 1/4 cup pickle juice or spiced fruit juice.

(c) 1/2 cup brown sugar and 1/2 cup crushed pineapple.

Evaluate the cooked product:

Appearance: lean — *pink,* reddish brown, gray, greenish, off-color
fat — *golden brown,* creamy white, opaque, translucent
Texture: lean — *tender,* tough, fibrous, leathery
fat — *crisp,* pliable
Palatability: *salty,* extremely salty, flat, rancid, bitter

AMERICAN-STYLE CURED HAM

Assemble these utensils:

kitchen scale
sharp knife
cutting board
syringe
thermometer
salometer, 100°
250 ml. graduated cylinder
2 2-qt. bowls
barrel or any wide container for curing ham

Assemble these supplies:

1 leg of ham (approximately 5 kilos)

Pumping Solution:

1 cup water
200 grams refined salt
80 grams brown sugar
60 grams saltpeter (KNO^3)
1 tsp. vetsin (MSG)
salometer reading — 95°

Pickle Solution:

1 cup water
200 grams refined salt
60 grams brown sugar
60 grams saltpeter (KNO_3)
salometer reading — 75 - 80°

Steps in preparation:

1. Boil the pumping and pickle solution. Strain and cool to 20 - 23°C.
2. Trim the ham and locate the artery. The temperature of the ham should be 23 - 25°C. Weigh.
3. Inject the pumping solution through the artery and towards the bone (160 grams of pumping solution per kilo of ham).
4. Immerse in pickle solution in the barrel and store in the refrigerator (40 - 42°C). Allow 8 days per kilo of ham.
5. Wash well and hang in the smoke room for 3 - 4 hours at 70 - 80°C.
6. Remove from the smoke room. Wrap in cheesecloth and put in the freezer until ready to use.

Cooking the ham:

1. Parboil the ham in plain water for 30 - 40 minutes to remove further excess of salt and other foreign bodies. Drain water and add the following ingredients:

For every kilo of ham add:

3/4 cup of beer
2 pieces of cloves
2 pieces of bay leaves
1 cup pineapple juice
enough water to cover

2. Cook at 15 pounds pressure in a pressure cooker for around 40 - 50 minutes or in a water bath until the skin separates from the underlying fat. Carefully remove the skin, cover the ham with refined sugar and place in the oven until the sugar caramelizes. Garnish with pineapple slices.

3. Cut the ham into about 250 grams each piece and parboil for 15 minutes. Drain water and add the same ingredients above.

For every 250 grams of ham add:

1/4 cup of beer
1 piece of clove
1 piece of bay leaf
1/4 cup pineapple juice
enough water to cover

4. Cook until the skin separates from the underlying fat and finish cooking in the oven until the sugar caramelizes. Serve also with pineapple slices or tidbits.

Use evaluation sheet listed under Chinese-style ham.

CHINESE STYLE HAM

Assemble these utensils:

syringe and needle
liquid measuring cup
measuring spoons

Assemble these supplies:

5 kilo ham leg

For pumping pickle:

4 cups of saturated salt solution
1 cup cold water
3 1/2 tablespoons of sugar
1 1/2 teaspoons of salitre (saltpeter)
1 drop of oil of cloves
1 drop of oil of anise
2 drops of maplein

For dry cure mixture — for every 5 kilos of meat:

15 tablespoons of salt
7 tablespoons of sugar
2 1/2 tablespoons of salitre (saltpeter)

Steps in preparation:

1. Prepare pickling solution. Boil enough salt in water to make a concentrated saline solution. Allow the solution to cool overnight in the cooler.
2. Add about 3/4 liter of the clear solution, about 1/4 liter of cool but previously boiled water as diluting fluid so that it will have a salometer reading of about 85-90°F.

   To every liter of the diluted solution dissolve 3% brown sugar and 2% salitre based on the volume of the solution.
3. Inject 200-250 of this solution at several points around the joints for every leg weighing from 4-5 kilos.
4. Place the treated leg back in the cooler which registers a constant degree of 34-38°F.
5. After 15 days, take the salted legs out again and apply the same amount of ingredients but without necessarily applying another injection of the pumping pickle.
6. Leave the resalted leg for another 10-15 days inside the cooler; that is allowing 5 days to every kilo of the meat.
7. After this period, wash away the excess salt and slimy material by soaking it for an hour in water and then cleansing the leg of its slimed and hardened salt with the use of a brush with running water. Hang to dry.
8. Place inside a drier for about 12 days or until the color turns cherry-red or brown cherry-red when it is ready to be taken out.

   To attain this, the temperature of the drier should be maintained at about 100°F for 8 hours every day. Lower degree will result in the spoilage of the ham and higher degree will tend to melt the fat and consequently create a great loss of weight.

Evaluate the product:

Appearance: lean — *delicate pink shade without color variation throughout*, gray, discoloration

fat — *firm*, lardy, *creamy white, glistening*, dull, dead-white; *fat adhering to lean;* separates when sliced

Texture: *velvety, smooth*, with distinction (open spaces) or coarse grain (string appearance)

Palatability: *pleasingly salted*, extremely salty, bland, flat

LABORATORY PROBLEM 23 Curing of Beef

CORNED BEEF

Assemble these utensils:

kitchen scale
measuring cups
measuring spoons
kitchen knife
chopping board
2-quart saucepan
refrigerator dish

Assemble these supplies:

1 kilo beef, less tender cuts like brisket (*punta de pecho*), rump (*tapadera*), ham (*pigi*) or cuts used for stewing.
1/4 cup salt
1/4 cup sugar
1/2 teaspoon saltpeter
1/2 teaspoon baking soda
1 teaspoon vetsin (MSG)
1 pint boiling water

Steps in preparation:

1. Combine last six ingredients. Cool.
2. Place beef and pickling mixture in a refrigerator jar (dish with a cover).
3. Keep meat thoroughly under the pickling liquid by weighing down with a piece of clean wood.
4. Store in the refrigerator for one week. Check for slime. (Even in the refrigerator and on brine, molds form.)
5. Drain from the brine and smoke if desired.
6. Cook in boiling water until very tender.
7. Discard salty cooking water.

Helpful hints:

Serve with sauteed onions, tomatoes, and cabbage or add some noodles like *sotanghon* or macaroni.

CURED MECHADO

A good nourishing dish, tasty as only beef could be.

Assemble these utensils:
kitchen scale
measuring spoons
kitchen knife
chopping board
2-quart utility bowl
utility plate
skewer
refrigerator dish

Assemble these supplies:

1 kilo beef (whole piece *kabilugan* or *pierna corta*)
4 strips of lardoons (pork fat)
1 1/2 tablespoons salt
2 tablespoons sugar
1 teaspoon saltpeter
1 teaspoon vetsin (MSG)
1/2 teaspoon cloves

Steps in preparation:

1. Insert lardoons through the whole length of the meat.
2. Combine curing ingredients.
3. Rub on all surfaces of the beef.
4. Prick beef with a skewer at several points.
5. Store in a covered dish in a refrigerator for at least four days but preferably for one week.
6. Lift from jar, wash, drain, and smoke from 2 - 3 hours at 70 - 75°C or until the surface has a smoky smell.
7. Use at once or store in the coldest part of the refrigerator for as long as you want.

Helpful hints:

Cook like a pot roast in a pan with rack and water. Water may be evaporated to dryness after the meat is very tender.

REFERENCES

1. Anonymous, *How to Cure, Smoke and Process Meats More Profitably* (Chicago, Griffith's Laboratories Inc., 1956).
2. Anonymous, *How To Prepare Ham-cured Duck* (Dept. of Agriculture and Natural Resources, Philippine, 1957)
3. Anonymous, *Leaflets on Curing of Pork.* Bureau of Animal Industry Manila. Unpublished.
5. Avery, A.C., *Fish Processing Handbook for the Philippines.* Research Report 26 (Washington, D.C., U.S. Gov't. Printing Office)
6. Brown, M.B., *Pickles and Preserves* (New York: Wilfred Funk Inc., 1955)
7. Caldito, A. "Cornstarch, Wheat Flour, and Cassava Starch as Binders for Labahita (surgeon) Fish Sausage." U.P. B.S.F.T. thesis, Unpublished.
8. Duncan, W.J., *Ham: A Picture Guide to Preparation and Cooking of Gammons.* London Practical Press Ltd, 1950)
9. Gerrard, F., *Sausage and Small Good Production,* 4th ed. (London Leonard Hill Books, 1953)
10. Gibbons, N.E. Wiltshire Bacon. *Advances in Food Research,* 1953
11. Guzman, N.P., "Laboratory Procedures for Food Preservation." U.P. College of Home Economics. Unpublished.

SECTION EIGHT

Fermentation and Pickling of Fruits and Vegetables in Salty Medium

Pickles are combinations of fruits and vegetables preserved in vinegar with or without spices. We have a taste for "the sweet and the sour." The section brings together choice recipes that we hope will stimulate anyone and everyone's appetite.

Helpful hints to the teacher:

There should be a close tie-up between this section and the succeeding ones on fermentation. Differentiate the types of fermentation. Among the points to be stressed are the factors affecting fermentation.

1. Composition of the material being fermented — ask the students to prepare a list of the sugar content of the commonly fermented vegetables.
2. Salt concentration — discuss the effect of concentration of salt on the rate of fermentation.

   It is good to acquaint the students with the salinometer and the terminology of expressing salt concentration at this stage.

   Acquaint the students also with the way of determining salt concentration in the absence of the salinometer.
3. Environmental conditions — mention the effect of temperature on the rate of fermentation; describe also the importance of oxygen tension.

Evaluate the products and then discuss the characteristics of well-made pickles. Ask the students to give the causes for spoilage in pickles. Discuss also the questions pertaining to this section given at the end of the manual.

TABLE 12. BRINE CHART (CHENOWETH, 1945)

Salometer Reading	Percent Salt	Salt per Quart of Water (ounces)	Uses and Character of Brine
20	5.3	2	Dill pickles only
40	10.6	4	Pickles and most pickled vegetables (Floats egg to surface)
60	15.9	6	Checks fermentation
80	21.2	8	Stops fermentation
100	26.5	10	Saturated solution

Various fruits and vegetables may be pickled but the most common pickles are made from cucumbers. Cucumbers may be unfermented partially or fully fermented. Pickles are usually pasteurized to improve their keeping quality.

Pickles have been classified under three main headings: dill, sour, and sweet (Binsted, Devey and Dakin, 1962)

I. DILL PICKLES

A. Fermented dill pickles
   1. Genuine dill pickles—produced by the natural fermentation of fresh cucumbers in a 32° - 36° salinometer brine, to which has been added about 10 to 15 pounds of cured dill weed, mixed spices and a quart of vinegar of 10% acidity per barrel.
   2. Genuine Kosher dill pickles—more highly spiced than the genuine dill pickles including onion and garlic flavors.
   3. Polish dill pickles—fermented in a 20° salinometer brine; has dill weed, onions, garlic, and red pepper.
   4. Overnight dill or fresh fermented dill pickles—fermented in a 20° salinometer brine.
   5. Overnight or fresh fermented Kosher dill pickles like overnight dill or fresh fermented dill pickles fermented for a week in a 20° salinometer brine but prepared Kosher-style.

B. Unfermented dill pickles made directly from fresh cucumbers
   1. Fresh or pasteurized dill pickles are fermented and are packed in 20° salinometer brine containing 5.3% salt, 1% acetic acid, 0.5 to 3% sugar, together with dill and other essential spice oils.
   2. Iceberg or quartered dill pickles are similar to fresh or pasteurized dill pickles except that the ends of the cucumbers are sliced off and the fruit quartered.

C. Dill pickles made from salt stock
   1. Processed imitation or summer dill pickles are made from fully cured salt stock, freshened to reduce their salt content and placed in a solution of turmeric and aluminum.
   2. Processed imitation or summer Kosher dill pickles.
   3. Pasteurized processed dill pickles—are prepared from freshened salt stock which is then treated in a similar way as fresh or pasteurized dill pickles.
   4. Pasteurized processed Kosher dill pickles.

II. SOUR PICKLES—prepared from fully fermented salt stock

A. Sour pickles
  1. Plain sour pickles
  2. Sliced or hot sour pickles

B. Mixed sour pickles
  1. Mixed unspiced
  2. Spiced or hot mixed pickles
  3. Mixed chutney—consists of chopped, freshened salt stock, cauliflower and silverskin onions, seasoned with lemon peel and sliced onions, coriander and celery seed, Japanese chillies, oils of cassia and cloves and covered with vinegar.

C. Relish, Chow chow, etc.
  1. Chow chow is the same basis as chutney, but is covered with a chow sauce made from yellow and brown mustard seed, turmeric, garlic, cinnamon, cloves, ginger, nutmeg, cayenne, black and white pepper and vinegar.
  2. Relish.

III. SWEET PICKLES

A. Plain sweet pickles—are prepared from freshened salt stock, vinegar, sugar, and spices. The sugar content lies between 12 and 22%.
  1. Standard sweet pickles
  2. Midget sweet pickles
  3. Burgherkins
  4. Slices, chips, or wafer—sliced transversely to give thin dices.
  5. Candied chips—contain 44-55 per cent sugar and suitable spice oils.
  6. Sweet dill pickles—similar to candied chips but are sliced longitudinally and are made from genuine dills or dill flavors added.
  7. Bread and butter or country style pickles are made from fresh cucumbers and onions, washed, sliced into chips and soaked for 12 hours in a 25° salinometer brine. They are then packed in jars, covered with heavy sirup of 60% sugar, containing 5% vinegar, and pasteurized.
  8. Peeled pickles—peel of large salt stock, freshened and processed as for plain sweet pickles.

B. Mixed sweet pickles
  1. Plain mixed sweet pickles are prepared from brined onions and cauliflower, and salt stock after freshening. They contain about 20% sugar.
  2. Mustard pickles or sweet chow are similar to chow chow, only they contain 20% sugar.
  3. Jamaica pickles—consist of

preserved ginger, cut cauliflower, pickles, onions, raisins, lemon, orange and citron peel, brown sugar and vinegar covered with a spiced cooked sauce.

C. Relish or chopped sweet pickles

1. Plain relish — contains chopped freshened salt stock, green tomatoes, cauliflower, red peppers, and onion in a 20% sirup.
2. Spread relish—similar to plain relish only made up of half mayonnaise and half vegetables.
3. India relish—contains the ingredients of relish but also red bull nose peppers.
4. Piccalilli—sliced green tomatoes, onions, and sweet pickles covered with a spiced sweet vinegar.
5. Fruit relish—plain relish components with citron, orange, lemon peels, and sugar.
6. Mexican relish
7. Vegetable relish—contains ordinary relish ingredients plus ground fresh cabbage, mustard and celery seed, spices and sugar to finish at 25% sugar and 1.5% acetic acid.

TABLE 13. DO'S AND DON'T'S ON PICKLING

1. Select your products.

Use only firm, fresh, unbruised fruits and vegetables of the *best quality*. Cucumbers and tomatoes are best if pickled within the day of harvest. Fruits may be slightly underripe.

2. Check your equipment.

Use a stone crock or clean paraffined wooden container for curing or fermentation. At home, you may find a 2- or 4-gallon container (*tapayan*) useful.

Cook pickles in kettle of enamelware, glass or stainless steel. Avoid iron, copper, or zinc kettles to preserve the color and nutritive value of the pickles. Use wooden or stainless steel long handled spoons for stirring.

Pack in glass with glass tops preferably since the acid and salt of the pickle may corrode the metal cups.

3. Work quickly to conserve "freshness."

Do not delay pickling to avoid deterioration.

4. Choose your method.

Use modern pickle recipes. Follow the procedures within reason but taste the pickles before storing them.

5. Watch your time tables.

Increase the salt concentration as called for in the procedure.

6. Make sure vegetables are below the brine at all times.

   Remove the scum from the top of the brine every day.
7. Preserve your acetic acid preserves by proper pasteurization.

Pasteurization not only lengthens storage life, but also preserves the flavor of the pickles.

LABORATORY PROBLEM 24 Long-time Cures

BRINED CUCUMBERS (SALT STOCK)

It may take 3 weeks or more, but this is a good starting material for many a pickle. They turn from chalky-white and opaque in cross-section to an olive or yellowish-green, translucent flesh as fermentation proceeds.

Assemble these utensils:

4-quart glass jar
Paraffined board cut to fit closely in the top of the jar or waxed paper.
Clean cloth about 6 inches larger than the top of the container.
A glass jar or other container which can be filled with water to use as a weight
kitchen scale

Assemble these supplies:

2 kilos fresh immature medium sized cucumbers
2 1/4 cups salt
3 quarts warm water

Steps in preparation:

1. Wash the container thoroughly with hot soapy water, rinse and dry.
2. Wash the cucumbers, weigh and pack them into the containers.
3. Make the brine: dissolve 3/4 cup salt per quart of warm water. Allow to cool.
4. Cover the cucumbers with brine.
5. Let stand covered with the waxed paper weighed down properly and the cloth to cover overnight.
6. Next day, add 1/2 cup of salt to each 3 cups of cucumber in order to maintain the strength of the brine.
7. Continue adding salt daily for 3 weeks. As the pickles ferment, a scum will form on the surface of the brine. This scum is injurious to the acidity of the brine and should be skimmed off as it forms.
8. Note the end of fermentation. The product is known as "salt stock" and may be used for sour, sweet-sour, or mixed pickles, relishes, or other products after proper desalting.

SOUR CUCUMBER PICKLES

These may be made from either salt stock or fresh cucumbers. The difference in procedure is in the initial step.

If from salt stock: allow the cucumbers to stand in several changes of water — 2 to 3 hours in each—until the salt taste has practically disappeared.

If from fresh pickles: cover the cucumbers with a 40° salometer brine (1/2 cup salt per quart of water) and allow to stand overnight. Drain off and discard the brine. Freshen through 2 to 3 changes of clear water. Allow 1 to 2 hours for each change of water.

Assemble these utensils:

liquid measuring cup
measuring spoons
cheesecloth bag
2-quart saucepan
4 pint jars

Assemble these supplies:

2-quarts cucumber (either fresh or fermented)

For each quart pickling solution

2 1/2 cups vinegar
1/2 cup sugar
2 teaspoons celery seeds
2 teaspoons whole cloves
2 teaspoons mustard seeds
2 teaspoons pepper corns

Steps in preparation:

1. Boil the vinegar, sugar, and the spices tied in a bag for 5 minutes. Remove the spice bag before putting the boiling sirup over the cucumbers.
2. On the second day drain off the sirup and heat to a full boil.
3. Pack the cucumbers into hot sterilized jars and cover with boiling hot sirup. Remove trapped air bubbles with a knife.
4. Seal it immediately.

Another method would be:

1. Place the prepared cucumber in a glass jar and cover with vinegar heated to a boiling point.
2. Allow to stand 1 to 2 days then drain off the solution.
3. Make up a new solution by using 1 cup of vinegar to 3 cups of the drained solution.
4. Heat to boiling and pour over the cucumbers. Add spices in cheesecloth bag, if desired.
5. After 2 to 3 days remove the pickles from the solution, pack them moderately tight into clean dry jars.
6. Heat the pickle solution to boiling and fill the jars to within 1/4 inch of the top.
7. Process in the water bath for 6 to 8 minutes.

SWEET CUCUMBER PICKLES

Prepare from the salt stock by removing the cucumber from the acid brine, wash in fresh water to desalt, and add a pickling solution.

Assemble these utensils:

liquid measuring cups
nest of measuring cups
measuring spoons
cheesecloth bag
2-quart saucepan
4 pint jars

Assemble these supplies:

2 quarts of salt stock
1/4 teaspoon of alum

For 1 quart pickling solution

- 1 quart vinegar
- 3 cups sugar
- 2 tablespoons whole allspice or
- 1 tablespoon ground allspice
- 3 tablespoons white or yellow mustard sticks
- 3 tablespoons celery seeds
- 2 tablespoons cinnamon sticks

Steps in preparation:

1. Prepare the amount of pickling solution necessary (approximately one half of salt stock). Place the vinegar in a saucepan. Add the sugar (1/2 cup per quart of vinegar). Tie the spices in a cheesecloth bag and add it to the saucepan.
2. Heat to boiling and add over the prepared salt stock to which 1/4 teaspoon of alum had been added. Place the spice bag in the pickle jar.
3. Allow to stand 2 to 3 days and if cucumbers have become plump, drain off the pickle solution, and 1/2 cup of sugar, heat to boiling and pour over the cucumbers while the sirup is still boiling hot. Do not boil the cucumbers in the pickling solution.
4. Repeat this operation until pickles are as sweet as desired. Remove the spice bag as soon as pickle solution is spiced to taste.
5. Pack the finished pickles loosely into clean jars.
6. Boil the pickle solution to approximately 3/4 cup for each pint jar.
7. Pour hot solution over packed pickles to fill the jars to within 1/4 inch of the top. Remove trapped air by inserting a knife against the sides of the jar and be sure the pickles are completely immersed with hot sirup.
8. Adjust the covers and process in water bath for 8 to 10 minutes.

LABORATORY PROBLEM 25 Short-time Cures

NINE-DAY SWEET CUCUMBER PICKLES

Assemble these utensils:

- kitchen knife
- chopping board
- measuring cups
- dietetic scale
- 2-quart saucepan
- 4-quart bowl
- 2 8-ounce sterilized glass jars

Assemble these supplies:

- 8 small or 4 medium cucumbers cut crosswise into 1/2 inch slices
- 1/2 cup salt
- 4 cups water
- 2 cups vinegar
- 2 1/4 cups sugar
- 1/2 ounce each allspice and stick cinnamon
- 1/2 ounce celery seed

Steps in preparation:

1. On the first day: Put sliced cucumbers, cut crosswise into 1/2 inch slices, in a brine "strong enough to float an egg" by dissolving 4 ounces of salt to 1 quart of water and let stand for 3 days.
2. On the fourth day: Drain cucumbers and cover them in clear water for 3 days changing the water each day.
3. On the seventh day: Drain cucumbers and cover with a weak brine (1 tablespoon of salt 1 quart of water) to which has been added a piece of alum the size of a marble. Slowly simmer cucumbers in this mixture for 3 hours. Drain.

   Make a sirup combining the last four ingredients. Let the ingredients come to a boil and pour, while hot, over the drained cucumbers.

   Let the sirup stand overnight. On each of the next two days drain off sirup, bring it back to a boil and pour it over the cucumbers letting them stand in the sirup overnight after each processing.
4. On the ninth day: Drain off the sirup, heat it to the boiling point, and pour hot over the cucumbers.

   Pack the hot pickles in sterilized jars, cover with the sirup and seal.

   Makes 2 8-oz. pickle bottles.

LABORATORY PROBLEM 26 Quick, Unfermented Pickles

BREAD AND BUTTER PICKLES (24-HOUR CURE)

Assemble these utensils:

- measuring cups
- measuring spoons
- 2 utility bowls
- kitchen knife
- chopping board
- 2-quart saucepan
- wooden spoon

Assemble these supplies:

- 6 medium cucumbers
- 3 onions
- 3/4 cup salt
- 4 cups water
- 1 cup vinegar
- 1 cup sugar
- 1 teaspoon celery seed
- 1 teaspoon mustard seed
- 3/4 teaspoon turmeric
- 1/2 teaspoon ginger
- 1/4 teaspoon pepper

Steps in preparation:

1. Wash cucumber and peel onions.
2. Slice cucumbers and onions thin and let stand in a brine of salt and water for 3 hours (3/4 cup salt per quart water).
3. Drain and rinse under cold water.
4. Combine vinegar, sugar and spices and bring to a boil, add cucumbers and onions and stir over low heat for 2 minutes.

5. Place in hot, sterilized jars and seal.

Evaluate the product:

Appearance: color — translucent opaque, bright green *olive green,* grayish, blackened
shape—*whole,* hollow, shriveled

Texture: *crisp,* firm, tough, soft, slimy

Palatability: *characteristic flavor,* very sour, very sweet, very spicy, bitter.

CUCUMBER RELISH

Assemble these utensils:

measuring cups
food chopper
measuring spoons
cheesecloth bag

Assemble these supplies:

1 quart chopped cucumbers
1/4 cup onions
1 cup sweet red peppers
1/2 cup sweet green peppers
1 pint vinegar
1/2 to 1 cup sugar
2 teaspoons salt
1 teaspoon each of mustard seed, broken cloves, broken cinnamon bark, and allspice

Steps in preparation:

1. Prepare the vegetables by removing skin from onions, core and seed from peppers.
2. Place prepared vegetables in chopping bowl and chop into desired size pieces or put through medium size cutter of the food chopper.
3. Mix the vegetables and cover with a brine made by using 1/4 cup of salt with each quart of water. Allow to stand for 3 to 4 hours.
4. Tie the spices, except mustard seed, loosely in a cheesecloth bag and simmer in the vinegar for 20 minutes; restore the vinegar to original volume by adding water. Allow to stand until vegetables are ready to go into this pickle solution.
5. Drain off the brine from the vegetables.
6. Press lightly to expel all free brine and place the vegetables in clear water for 1 or 2 hours.
7. Drain off all the water and pour over the vegetables the pickle solution to which has been added the salt, sugar, and mustard seed.
8. Allow to stand for 24 hours.
9. Drain off the pickle solution and pack vegetables into clean jars to form a medium close pack.
10. Concentrate the pickle solution to approximately 3/4 cup for each pint jar of vegetables.
11. Pour the hot pickle solution over the packed vegetables.
12. Adjust the covers and process in the water bath at boiling temperature, pints 5 minutes, quarts 8 minutes.

OTHER PICKLED FRUITS AND VEGETABLES

Other vegetables and fruits may be satisfactorily pickled. Only a few are listed here, but there is no end to the variety of fruits, vegetables, and spices that can be combined to make a delectable, appetizing pickle. The commonly fermented vegetables are cabbage, radish, ampalaya, mustard leaves, onions, green papaya, and mango.

MANGO CHUTNEY

A sweet-sour mixture served at the U.P.H.E. Tearoom. It goes very well with curried dishes.

Assemble these utensils:
- dietetic scale
- kitchen knife
- paring knife or vegetable peeler
- cutting board
- measuring cup
- 4-quart saucepan
- wooden spoon
- 4 8-ounce sterilized glass jars

Assemble these supplies:
- 1/8 kilo garlic, thinly sliced
- 1/4 kilo sweet red pepper
- 1/4 kilo sweet green pepper
- 1/8 kilo native onions
- 1/4 cup ginger, finely sliced
- 4 cups mango chips (soaked in brine solution overnight or in 1% calcium chloride or lime solution)
- 3 cups brown sugar, loosely packed
- 1 cup vinegar
- 1/2 cup raisins

Steps in preparation:
1. Combine vinegar and sugar in a saucepan. Boil until thick.
2. Add vegetables and spices, allowing brief intervals between addition of ingredients.
3. Cook mixture with constant stirring over medium flame until thick enough to spoon out.
4. Pack into 4 8-ounce bottles.

Yield: 4 8-ounce bottles.

Evaluate the product:

Appearance: color — *beautifully colored,* pale, discolored, blackened, *translucent,* opaque, *neatly cut*

Texture: *chewy,* tough, soft, distintegrated, mushy

Palatability: *pleasingly sour,* flat, very sour, very sweet, bitter

BURONG MUSTASA (*Pickled Mustard Leaves*)

Excellent scrambled with eggs, onions, and tomatoes for breakfast.

Assemble these utensils:
- jar
- cover for jar

Assemble these supplies:
- 1 kilo mustard leaves
- 1/2 kilo rice water
- 1/2 cup salt

Steps in preparation:
1. Wash the mustard leaves very well and remove the roots and old leaves.
2. Sprinkle salt to wilt. Boil the rice water with salt and cool.
3. Put the withered mustard in a jar and add the rice water. After 2 days it should be sour.

PICKLED ONIONS

An interesting appetizer.

Assemble these materials:

measuring spoons
measuring cups
8 pint jars

Assemble these supplies:

4 quarts small onions
1 cup salt
1 quart boiling water
1 quart vinegar
6 tablespoons allspice
2 tablespoons peppercorns, small hot red peppers

Steps in preparation:

1. Peel the onions, cover them with cold water and let stand overnight.
2. In the morning drain and pour over them a hot brine made by adding the salt to the boiling water.
3. Let the onions stand in a cool place for 24 hours. Then drain and rinse thoroughly.
4. Heat the vinegar slowly to a boil with the allspice and peppercorns tied in a bag.
5. Add the onions, bring the vinegar again to a boil and pack the onions in sterilized jars.

PAPAYA ACHARA (*Pickled Papaya*)

Assemble these utensils:

kitchen knife
cutting board
measuring cup
measuring spoon
cheesecloth bag
2 2-quart utility bowls
2 utility plates
peeler
grater
1 2-quart saucepan
2 utility trays
wooden spoon
5 8-ounce glass jars

Assemble these supplies:

coarse salt
1 quart green papaya, squeezed and grated
1 medium sweet red pepper, sliced to desired size and shape
1 medium sweet green pepper, same as red pepper
12 native onions sliced into thin pieces
1 small ginger, sliced thinly, if desired
1 medium *singkamas,* same as red pepper
1 cup vinegar
1 cup sugar
1 teaspoon salt

Steps in preparation:

1. Grate a medium green papaya and let stand overnight in a covered bowl or jar with 1 teaspoon coarse salt per cup of pulp.
2. Next day place soaked papaya in a cloth bag and squeeze out the juice very well. Place in a tray or *bilao* and dry under the sun for about 2 hours. In the laboratory, if time will not allow, spread the papaya on a tray and just sun it while the other vegetables and pickling solution are being prepared. Artificial drying inside the oven is also permissible.
3. Prepare other vegetables.

4. Prepare the sweet sour pickling solution by boiling the sugar and salt in the vinegar until they are dissolved. Cool slightly.
5. Add the papaya mixed with the onions and garlic. Stir well.
6. Combine other vegetables and pack *attractively* in sterilized jars. Insert a knife to remove air bubbles.
7. Seal tightly.

Yield: 5 8-ounce glass jars

Evaluate the product:

Appearance: color—*brightly colored,* pale, discolored, blackened, opaque, *translucent neatly cut,* roughly cut

Texture: *crisp,* tough, soft, mushy

Palatability: flat, *pleasingly sour,* very sour, bitter

PICKLED WATERMELON RIND

Come watermelon time, be sure to use the pulp and seeds and rind.

Assemble these utensils:

- dietetic scale
- measuring cup
- measuring spoon
- 4-quart utility bowl
- 2 utility plates
- kitchen knife
- cutting board
- 4-quart saucepan
- 6 8-ounce sterilized jars
- fork

Assemble these supplies:

- 5 pounds (3 1/2 quarts) firm fresh watermelon rind with large proportion of white rind
- 8 teaspoons alum
- 1 quart vinegar
- 2 teaspoons whole cloves
- 2 cinnamon sticks
- 4 pounds sugar

Steps in preparation:

1. Cut off outer green skin and all pink from the rind.
2. Cut peeled rind into small triangular pieces. Weigh.
3. Put rind in a large kettle. Cover with water and boil until rind can be easily pierced with fork.
4. Add alum to rind. Remove from heat. Let stand overnight.
5. In the morning, rinse rind under running water; drain.
6. Return rind to kettle. Add the vinegar, cloves, and cinnamon sticks. Pour sugar over rind. Bring to boil each day for five consecutive days.
7. Pack cooked rind and a piece of cinnamon into hot sterile jars after the fifth cooking. Fill jars with hot sirup. Seal at once.
8. Store 3 weeks before tasting.

Yield: 6 pints of pickles.

Evaluate the product:

Appearance: color — bright green, *olive green,* grayish, blackened, opaque, *translucent*

shape—*whole,* hollow, shriveled

Texture: *crisp, firm,* tough, soft, slimy, mushy

Palatability: *pleasingly sweet sour,* very sweet, very sour, very spicy, bitter

SECTION NINE

Fermentation of Fruits in Sirupy Medium

Cull fruits and trimmings of fruits can still be used to make delicious products. Who would not extol the taste of a well prepared wine? Who would not be pleased with a bountiful harvest of *nata* or the flavor of a good fruit vinegar?

Helpful hints to the teacher:

As in the preceding section, emphasize the factors that affect fermentation, namely:

1. Composition of the material being fermented
2. Sugar concentration—this is a good time to discuss the methods of determining sugar concentration in various juices. Demonstrate the use of the Brix or Balling hydrometer. (See directions on opposite column.)
3. Environmental conditions—Point out as the work proceeds the effect of temperature, oxygen content, and the rate of fermentation.

Assign the group to answer Questionnaire 7.

DIRECTIONS FOR USE OF THE HYDROMETER

1. Clean hydrometer thoroughly and dry each time before being used. Handle with clean dry hands or with clean cloth.
2. Use with fluid juices otherwise if the liquid to be tested is thick or slimy, the resting point of the hydrometer will be uncertain.
3. Pour a small quantity of the juice into a glass cylinder and drop the hydrometer carefully.
4. Make sure that instruments is floating freely and touches neither the bottom nor the sides of the cylinder.
5. To read correctly, put the eye on a level with the surface of the liquid.
6. Since the specific gravity of juices varies with temperature, bring the juice to the standard temperature for which the hydrometer is adjusted (usually 60°F) or make the necessary corrections in the reading. Add 0.1% for every 3° above the standard and subtract 0.1% for every 3° below.

LABORATORY PROBLEM 27 Nata

NATA DE COCO

A white gelatinous growth on a fermenting liquid.

Assemble these utensils:

grater
2-quart utility bowls
2-quart jar
wooden spoon
measuring cup
jelly bag
utility plate
2 big wide-mouthed glass jars

Assemble these supplies:

8 cups coconut water or coconut milk from 1 coconut
1 cup sugar
3 tablespoons glacial acetic acid
1/2 to 2 cups mother liquor or *nata* starter

Steps in preparation:

A. *To prepare the culture jars*:

1. Wash and dry thoroughly all culture jars and other receptacles to be used in propagating the *nata* organism.

   If there are no facilities for heat drying, dry them under the sun in a place relatively free from dust. In the laboratory, place clean jars on a tray and dry them in a warm oven, 200° — 300°F for 15 minutes.

2. When dried, cover the jars with clean Manila paper or cheesecloth. Secure cover on jars with string or rubber band.

B. *To prepare the starter*:

1. Inoculate 1 liter of the medium with a young culture of the *nata* organism.

2. Allow to stand undisturbed for at least one day in a covered culture jar (a 2-quart jar will do). If the *nata* is young and vigorous, a thin growth of *nata* will form on the surface of the fermenting liquid after 2 days.

C. *To prepare coconut water medium*:

1. Collect coconut water in a clean receptacle (basin, kettle or saucepan) by straining it through a piece of sterilized cheesecloth.

2. For every 8 cups of coconut water or coconut milk, add 1 cup of sugar.

3. Stir to dissolve the sugar well.

4. Heat to boiling point to kill undesirable organisms.

5. Cool mixture to room temperature.

6. Add 1/2 cup sugar and 1 1/2 tablespoons of glacial acetic acid per quart of coconut water.

7. Distribute the mixture in culture jars to levels of between 2 to 3 inches high allowing sufficient air space above the surface of the liquid.

D. *To inoculate and incubate*:

1. Inoculate 1 cup of the starter to every 4 cups of the medium.

2. Cover the jars and incubate at 28°C, the temperature most favorable for the growth of *nata*. Normal room temperature in the Philippines will do.

3. While the *nata* is forming the surface of the medium, leave the jars undisturbed.

E. *To harvest nata*:

1. After 10 to 15 days when *nata* is more or less 1 inch thick, pick *nata* from jars with a clean fork taking care not to contaminate the liquid which can be used as starter for subsequent growing of *nata*. Such a liquid is often referred to as "mother liquor."
2. Use the following proportions for growing *nata* over and over: For every quart of coconut water, add 1/2 cup of sugar and 1 1/2 tablespoons of glacial acetic acid. Inoculate the above mixture with 1 cup mother-liquor. Distribute in culture jars. Follow foregoing preparation of culture jars and coconut water medium.

F. *To prepare nata de coco dessert*:

1. Cut harvested *nata* into uniform pieces (1 x 1 inch square) and boil vigorously for one minute in an open pan. Boil *nata* in several changes of water until vinegar odor is removed. (Another method employed in removing the sour odor from harvested *nata* is to soak them whole in several changes of fresh water for several days until such odor is removed. The *nata* is then placed under the sun until it becomes very white. It is then cut into desired pieces and boiled in several changes of water before cooking in sirup.)
2. Prepare a thin syrup using 1 part sugar to 1 part water. Syrup must be sufficient to immerse all pieces.
3. Bring syrup to boiling point, add drained *nata* and simmer in an open pan for 5 minutes. Coloring, if desired, may be added at this stage.
4. Let *nata* stand in syrup overnight. Cover surface with a wax paper and weigh down with a saucer to have all pieces immersed in the syrup.
5. Next day, drain *nata* of syrup. Add sugar to syrup using 1/2 the amount originally used. Stir to dissolve sugar well and boil for 10 minutes.
6. Add *nata* and simmer again for 5 minutes. Repeat steps 3 and 4 until *nata* is translucent and well-penetrated with syrup. Any desired flavoring (vanilla, lemon, orange, pineapple) may be added to the syrup at the last boiling. Allow 1/2 teaspoon flavoring per pint of syrup prepared.
7. When ready to pack product, drain *nata* of syrup. Fill sterilized jars with the drained nata.
8. Bring syrup to boil and pour into nata-filled jars. Remove trapped air bubbles by inserting a knife against the sides of the jar.

9. Seal jars immediately and process in boiling water bath for 15 minutes.
10. Dry and cool jars completely before applying label.

NATA DE GUAYABANO

Assemble these utensils:

Same as *nata de coco*

Assemble these supplies:

guayabano

Steps in preparation:

The *guayabano* medium can be made from the mash obtained after extracting the juice. After preparing the medium, treat as in *nata de coco.*

NATA DE PIÑA

Assemble these utensils:

The same as *nata de coco*
In addition have a meat grinder.

Assemble these supplies:

Pineapple — almost any kind: overripe fruits, cubed pineapples, trimmings, excess juice, peelings.

Steps in preparation:

All steps the same as that of *nata de coco* except the preparation of the pineapple medium:

1. Wash fruits very well in running water.
2. Peel the fruits.
3. Cut the peelings as thinly as possible without removing the eyes.
4. Slice the pineapples and grind preferably in a meat grinder.

Evaluate the product:

Appearance: *translucent,* whitish, brownish, grayish, thick, thin distintegrated
Texture: *chewy,* soft, *tender,* tough
Palatability: *sweet,* sour, flat

WINE

The process for wine making is similar to that of vinegar making except that it stops alcoholic fermentation. For particular recipes, see those given further on the text.

Evaluate the product:

Appearance: *colored* or *colorless,* pale, hazy, muddy, darkened
Aroma: *clean smelling,* slightly moldy, foul, unnatural scent
Palatability: *smooth,* sweet, dry, harsh, pleasingly flavored, astringent, sour, unsavory

LABORATORY PROBLEM 28 Wine

BIGNAY (BERRY) WINE

Assemble these utensils:

4-quart saucepan
wooden spoon
fine strainer
measuring cups
measuring spoons

clean big bottle
4-quart utility bowl
utility plate
cotton

Assemble these supplies:

4 cups sound, ripe berries
3/4 cup sugar
4 cups water
1/4 teaspoon dry active yeast

Steps in preparation:

A. To prepare the juice:

1. Wash fruits and boil with an equal amount of water to get the extract.
2. Strain and measure. To every quart of the extract add 3/4 cup sugar.
3. Heat to boiling to sweetened extract.
4. Place in a stoppered (with container and allow to cool. Use cotton plug.

B. To ferment the juice (alcoholic fermentation, as in vinegar):

1. Add 1/4 teaspoon of dry active yeast to every quart of extract.
2. Set aside for at least 2 weeks or longer for complete fermentation.

C. To pasteurize the wine:

1. Decant the clear wine and heat to 50°C to kill undesirable organisms.
2. If preparing a big scale, age in barrel for a year or more.

BINUBODAN (RICE WINE)

Assemble these utensils:

2-quart saucepan
2-quart bowl
wooden spoon
2 tall bottles

Assemble these supplies:

3 liters rice (cooked)
5 grams *bubod* (leavened fermented rice) available in cake form

Steps in preparation:

A. To prepare the medium for fermentation:

1. Cook rice; let it cool by transfering it to a clean bowl.
2. Pound the *bubod* finely.
3. Disperse it evenly in the cooked rice with the aid of a wooden spoon.
4. Cover and wrap it tightly with a cloth or doubled waxpaper.

B. To ferment:

1. Set aside in a place where it is not disturbed. Let it stand for 4 - 6 days. (This depends upon the amount of rice used and the extent of fermentation you want.)
2. Squeeze the rice juice. Pour in a glass container. Stand for 2 - 3 days or until clear.

C. To pasteurize:

1. Filter or decant the wine.
2. Pasteurize for 20 minutes.
3. Seal completely, label, and store.

CASUY (CASHEW) WINE

Assemble these utensils:

- fruit wooden crusher or vegetable crusher
- jelly bag or fine strainer
- measuring cups
- measuring spoons
- 2-quart saucepan
- 2-quart utility bowl
- wooden spoon
- utility plate
- clean bottle
- cotton

Assemble these supplies:

- 18 - 20 big, sound and ripe *casuy* fruits (makes around 1 quart juice)
- 3/4 cup brown sugar
- 1/4 teaspoon dry active yeast

Steps in preparation:

A. To prepare the juice:

1. Wash fruits and remove the nuts.
2. Crush the fruits preferably through a wooden crusher or extract the juice by pressing. (Do not use iron utensils.)
3. Measure the juice. To every quart of juice add 3/4 cup sugar.
4. Heat the sweetened juice to 70°C.
5. Cool to room temperature for at least one hour.

B. To ferment the juice (alcoholic fermentation, as in vinegar):

1. Add 1/4 teaspoon of dry action yeast to every quart of juice.
2. Place in containers and loosely stopper the mouth of the container with cotton.
3. Set aside for at least 2 weeks or longer for complete fermentation.

C. To pasteurize: as in vinegar

1. Decant the clear wine and heat to 50°C to kill undesirable organisms.
2. If preparing a big scale, age in barrels for a year or more.

ORANGE WINE

Assemble these utensils:

- kitchen knife
- squeezer
- muslin bag
- spoon
- liquid measuring cup
- utility plates
- graduated cylinder
- hydrometer
- tray
- sterilized bottles
- bowls
- chopping board
- measuring spoons

Assemble these supplies:

- 1 dozen *daranghita*
- 2 milligrams sodium metabisulfite
- sugar
- 1/8 to 1/4 teaspoon yeast

Steps in preparation:

A. To prepare the juice:

1. Wash oranges thoroughly.
2. Cut crosswise and squeeze out the juice gently with the reamer.
3. Strain out coarse pulp and seeds by passing juice through a muslin bag.
4. Test the sugar content of the juice by means of a hydrometer.
5. Add enough sugar to make 22 - 24° Balling for a dry wine of medium alcoholic content and to 32 - 33° Balling for one that will contain a small amount of sugar after formulation is complete.
6. Add 2 milligrams of metabisulfite to the juice.
7. Pour the juice into sterilized jars.

B. To ferment the juice (alcoholic fermentation):

Follow procedure for alcoholic fermentation of vinegar.

C. To filter wine:

Same as in vinegar.

D. To pasteurize wine.

As in vinegar.

E. Optional to determine exact quantity of alcohol in the fermented juice.

If instruments are available, distillation may be performed to determine the exact quantity of alcohol in the fermented juice.

LABORATORY PROBLEM 29 Vinegar

FRUIT VINEGAR

The same procedure would be applicable in making coconut vinegar.

Assemble these utensils:

- kitchen scale
- food grinder or waring blendor
- measuring cups
- 4-quart utility bowl
- glass jar or bottle

Assemble these supplies:

- juice, fruit peels or core; or coconut water
- fresh yeast

Steps in preparation:

A. To prepare the juice:

1. Pass fruit through food grinder. Crush soft fruits by hand.
2. Mix peels and cores with equal volume of water and boil until soft.
3. Press the crushed fruits or boiled peels and cores through double thickness of cheesecloths.
4. Add 1/4 pound of sugar per liter of diluted fruit juice. There is no need for further sweetening of sugar cane juice, molasses, or other sweet fruit juices.

B. To ferment the juice (alcoholic fermentation):

1. Add 1/8 to 1/4 teaspoon of dry active yeast or an equivalent amount of compressed yeast to every quart of the tested fruit juice. Hydrate the yeast in a small amount of the juice before adding to the whole quantity to be used.
2. Mix thoroughly with the juice.
3. Transfer in a well-covered clay or glass jar. Cover with cloth to prevent the entrance of contaminants.
4. Let stand for 1 or 2 weeks or until the gas formation has ceased. This can be determined by saccharometer. When the Brix reading is zero, alcoholic fermentation is complete. Another method is actually weighing the sample. When the quantity of juice to be fermented is small enough to be easily weighed accurately this may be weighed from day to day thereby determining the loss of weight due to the escaping carbon dioxide. When loss of weight has practically ceased the fermentation may be regarded as complete.

C. To transform into vinegar (acetic fermentation):

1. When alcoholic fermentation has gone to completion, decant or separate the clear liquid from the sediment.
2. To every 4 parts of the clear liquid, add 1 part of good unpasteurized vinegar or "mother vinegar." The term "mother vinegar" applies to *acetobacter aceti* (vinegar bacteria) that is found in vinegar.
3. Mix thoroughly.
4. Cover the container with cloth to exclude insects.
5. Allow to ferment until the vinegar is strong enough to use.
6. Decant or separate the vinegar from the sediments and mother vinegar by filtration.

D. To filter:

1. Fold filter paper or carton flannel into a cone-shape form. Place in a funnel (glass funnel is preferred; metal ones can be readily attacked by acetic acid) and put over a convenient receptacle such as a bottle or jar.
2. Filter vinegar several times to make it clear or bright.

E. To pasteurize:

1. Transfer vinegar to final containers. Seal tightly and pasteurize at 140° to 160°F for 20 minutes. Use a thermometer to determine accurately the temperature of the water. Place jars or bottles in the boiler either on their sides or inverted in order

to insure the destruction of any organism on the stoppers.

2. Cool containers completely before applying label.

Helpful hints:

Test the sugar content of the fruit juice to be used with the aid of a sugar hydrometer before fermentation begins. (A Brix or Balling hydrometer is well-adapted to this purpose.)

Avoid *"stuck fermentation."* Never add vinegar to the fresh juice of fruits because it interferes with the yeast fermentation and will result in a weak vinegar.

Evaluate the product:

Appearance: *colored* or *colorless,* pale, cloudy, *clear,* muddy, darkened

Aroma: *typical sour odor,* moldy, artificial scent

Palatability: *pleasing flavor and odor, pleasingly sour, smooth,* dry

REFERENCES

1. American, A. A. and W. V. Cruess. *The Technology of Wine Making.* Avi Publishing Company, Inc. Westport, Conn., 1960.)
2. Guzman, M.P. *Laboratory Procedures for Food Preservation.* U.P. College of Home Economics. Unpublished.
3. Perez, E.D. *Recipes of the Philippines.* (Capitol Publishing House, Inc., Quezon City, 1960.)

SECTION TEN

Sugar Concentrates

When fruits are plentiful, you might like to try your hand at these sugar concentrates. Bottles of fancy preserves that used to be part and parcel of your grandmother's larder could very well be part of yours.

After mastering the technique of preparing the products listed here, you may be inspired to explore for yourself this vast field.

Helpful hints to the teacher:

There's a host of good down-to-earth rules to help you soar and explore this firmament of fruit sugar concentrates.

It is still wise to emphasize PECTIN-SUGAR-ACID ratio.

The manufacture of sugar concentrates is an important method of preserving fruit based on the principle of high solid and high acid content. Jelly formation is possible only with the proper pectin to sugar to acid ratio. Pectin gives the continuity to the jelly structure; sugar and acid give rigidity. The pectin and acid content of Philippine fruits are given in Table 14. On these properties of the raw material will depend the steps in the making of the sugar concentrate.

Have a brief discussion on questions dealing with sugar concentrates (Questionnaire 8) at the end of the manual.

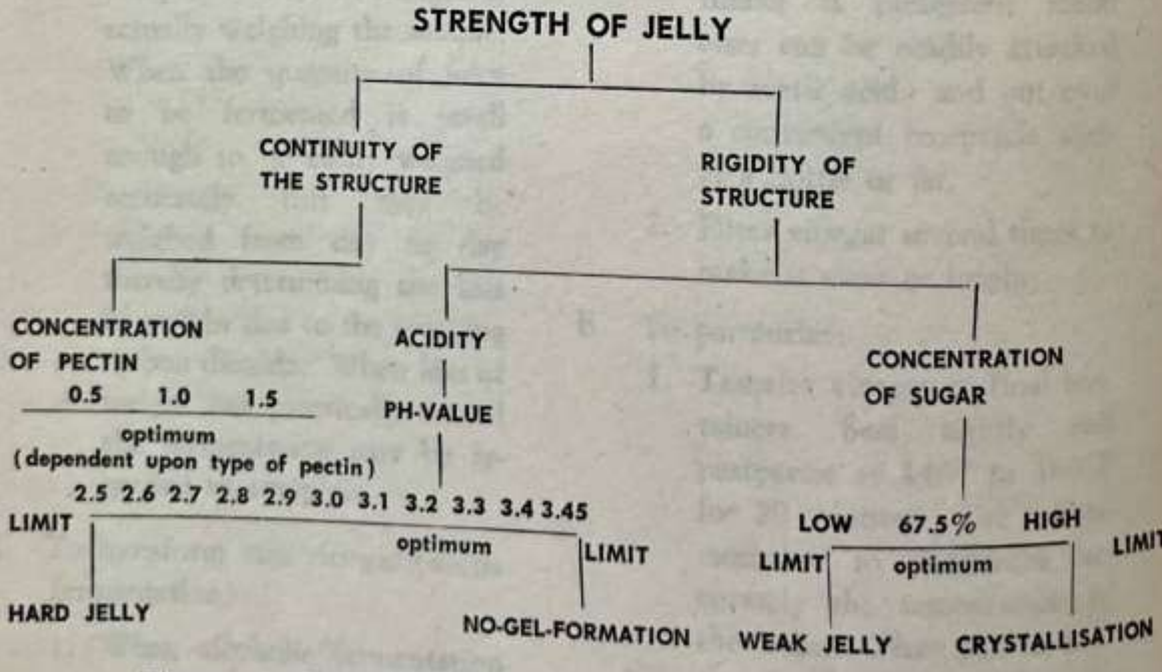

STRENGTH OF JELLY
CONTINUITY OF THE STRUCTURE
RIGIDITY OF STRUCTURE
CONCENTRATION OF PECTIN
0.5 1.0 1.5
optimum
(dependent upon type of pectin)
ACIDITY
PH-VALUE
2.5 2.6 2.7 2.8 2.9 3.0 3.1 3.2 3.3 3.4 3.45
LIMIT
optimum
LIMIT
HARD JELLY
NO-GEL-FORMATION
CONCENTRATION OF SUGAR
LOW
67.5%
HIGH
LIMIT
optimum
LIMIT
WEAK JELLY
CRYSTALLISATION

Figure 4. Factors Affecting Jelly Formation (Desrosier, 1963)

Table 14. Pectin Content of Some Philippine Fruits (Gonzalez, Palad, and Brillante, 1963)

LOCAL NAME	PART USED	TOTAL PECTIN (CALCIUM PECTATE) ON A FRESH BASIS
Anonas	Pulp ripe	2.14
	Peelings, ripe	2.10
	Pulp, unripe	2.03
Bayabas, berde	Whole fruit, ripe	1.41
	Whole fruit, unripe	1.92
Bayabas, pula	Whole fruit, ripe	1.52
	Whole fruit, unripe	1.18
Bariba	Pulp, ripe	1.48
	Peelings, ripe	2.68
	Pulp, unripe	1.48
	Peelings, unripe	3.36
Kamatis	Whole fruit, ripe	0.21
	Whole fruit, unripe	0.72
Granada	Pulp, ripe	2.95
	Seeds, ripe	1.89
	Pulp, unripe	3.08
	Seeds, unripe	1.60
Guwayabano	Pulp, ripe	2.14
	Pulp, unripe	1.77
Lokwat	Pulp, ripe	1.15
	Peelings, ripe	4.72
	Pulp, unripe	1.75
	Peelings, unripe	5.31
Papaya	Pulp, ripe	1.95
	Pulp, unripe	3.32
Pili	Pulp, ripe	3.06
	Pulp, unripe	3.34
Rimas	Pulp, ripe	1.87
	Pulp, unripe	3.96
Saguing, bungulan	Pulp, ripe	1.11
	Pulp, unripe	0.88
Saguing, butuan	Pulp, ripe	1.49
	Pulp, unripe	2.03
Saguing, gloria	Pulp, ripe	0.49
	Pulp, unripe	0.48
Saguing, lakatan	Pulp, ripe	2.08
	Pulp, unripe	1.78

Saguing, latundan	Pulp, ripe	1.05
	Pulp, unripe	2.97
Saguing, morado	Pulp, ripe	1.30
	Pulp, unripe	1.42
Saguing, saba	Pulp, ripe	1.72
	Pulp, unripe	1.58
Saguing, ternate	Pulp, ripe	0.93
	Pulp, unripe	0.95
Santol	Pulp, ripe	2.63
	Pulp, unripe	2.50
Sineguelas	Pulp and skin, ripe	2.52
Tsiko mamei	Pulp and skin, ripe	1.05
	Pulp and skin, unripe	2.78

LABORATORY PROBLEM 30 Jellies

GENERAL DIRECTIONS FOR FRUIT JELLIES

1. Choose the fresh, not overripe fruits which are rich in pectin and acid.

   Philippine fruits belonging to this category are: guava, santol, and tamarind. (See the table for a complete list.)
2. Prepare and cook the fruit.
   a. Wash and sort the fruits.
   b. Cut large fruits and remove large stem and leaves.
   c. Simmer the fruits gently until it is tender (about 3/4 to 1 hour) to break down the fruit and thus dissolve the acid and pectin in water. The amount of water to be used depends on the kind of fruit. In general have water just enough to cover hard fruits in the pan.
3. Strain the pulp.
   a. Scald the jelly bag with boiling water.
   b. Pour the cooked pulp into the bag and allow to drain about 1 hour until there is little liquid dripping from it. It is wise to allow the pulp to strain without squeezing if a clear jelly is required, but the juice should not be left for more than 1 day before the jelly is finished.
   c. Extract fruits rich in pectin a second time, if desired. Allow the pulp to drip for 10-15 minutes, return to pan mix about half the quantity of water originally used and simmer again for 1/2 hour. Tip back into bag and allow to drip about 1 hour. Either mix first and second extracts or cook each separately.
4. Test for acid.
   a. Prepare a standard acid solution. (1 tablespoon lemon juice with 1/2 cup water)
   b. Compare the acidity of the unsweetened fruit juice with this standard.
   c. Proceed as follows depending upon the acidity: if the fruit

is less acid than the standard, combine with a little fruit acid or commercial acid (citric or tartaric). Determine the number of teaspoons or tablespoons of acid per cup of juice needed to bring the acidity up to the standard, then adjust the bulk of the juice.

5. Test the fruit juice for pectin to determine proportion of sugar to be added.
   a. Simmer the fruit until the skin is softened.
   b. Take 1 teaspoon juice as free as possible from seeds and skin and place in a custard cup or glass and cool.
   c. Add 3 teaspoons of alcohol.
   d. Shake together gently and leave for one minute.
   e. Judge the quantity of pectin in the fruit. If there is a transparent jelly-like lump, the fruit is rich in pectin; if the clot of jelly is not very firm and is broken up into two or three lumps, the fruit has a moderate amount of pectin; and if the cloth is broken into numerous small pieces, the fruit has very little pectin.
   f. Proceed as follows: if the fruit is rich in pectin, a second extract can be made from the pulp as discussed in 3; if the fruit is poor, return the pulp to the pan with the juice for further cooking; or simmer the juice to remove some of the excess water and then retest.
6. Add the sugar.
   a. Measure the juice into a pan and bring to boil before adding the sugar. With pale juices, it might be better to add sugar when the juice is cold to preserve the color since the longer the juice and the sugar are heated together, the deeper the the color of the resulting jelly.
   b. Add the amount of sugar indicated desirable for the amount of pectin in the juice or 3/4 to 1 1/4 pound sugar per pint of juice; the larger the amount of pectin, the greater amount of sugar it can hold.
7. Boil as rapidly as possible without stirring until the setting point is reached. Setting will take place only with a proper pectin-sugar-acid ratio.
   a. Compute meanwhile the theoretical yield from the juice, based on the formula:

$$\text{Weight of jelly} = \frac{\text{Weight of soluble solids} \times 100}{\text{per cent soluble solid}}$$

$$\text{Weight of jelly} = \text{Weight of sugar} \times 10 \div 6$$

   b. Reduce the juice such that the weight of the juice together with the weight of the sugar added is about 8 ounces more than the calculated weight of jelly to be made. A set should be obtained about 10 minutes boiling with the juice.

8. Test the jellying point by either of 5 methods:

   a. Weight Test—Based on the fact that jellying occurs best when the sugar concentration is about 65 per cent (5 per cent from the fruit and 60 per cent from the added sugar). This method is very satisfactory if suitable scales are available and if small quantities of jam are made.

      (1) Weigh the empty pan and spoon at jellying.

      (2) Determine the desired final weight by multiplying the amount of sugar added by 10 and dividing by 6.
      Ex. 150 grams sugar × 10 ÷ 6 = 250 grams

      (3) Weight the actual sample after boiling, taking into account the weight of the pan and spoon.

   b. Volume Test — This is not accurate as weight-test method when using shallow pan.

      (1) Determine the final yield of jam as in the weight method.

      (2) Measure the volume of this given weight in the pan by marking the level of the water in the pan with a measuring stick.

      (3) Cook the jelly and remove the pan from the heat, let the bubbles subside and test with the stick.

      (4) Stop cooking when the jelly has been reduced to the marked level.

   c. Temperature Test — If the amount of pectin acid and sugar is adequate, the jelly will set when the juice is heated to 8.5 to 10.5°F above the boiling point of water. Therefore, the range is usually 220 up to 222.5°F depending on the desired consistency and the boiling point of water in the particular area.

   d. Sheeting Test or Flake Test

      (1) Dip wooden spoon into jelly, remove, and turn horizontally in the hand until the adhering jelly is slightly cooled.

      (2) Allow the jelly to drop from the edge.

      (3) Stop the boiling when the jelly sets on the spoon; the drops run together forming sheets or flakes which break off in a clean, sharp manner.

   e. Cold Plate Test

      (1) Do not allow jelly to boil rapidly while this test is being done, otherwise, the setting point may be missed.

      (2) Cool a teaspoonful of jelly on a plate.

      (3) Stop boiling if the surface of the lump sets and crinkles when pushed with the finger.

   In general, the Flake or Sheeting Test gives the most reliable result, especially when coupled with the thermometer test.

9. Finish the jelly.

a. Remove pan from heat as soon as the setting point is reached.

b. Remove the scum quickly by drawing a piece of clean kitchen paper with torn edges across the surface of the jelly or by straining the jelly through a piece of *sinamay* cloth, just previously scalded and wrung out to remove excess water.

c. Pour into warm jars at once or else the jelly will start to set in the pans and the consistency will be spoiled.

d. Set aside to cool undisturbed to allow proper gel formation and pour melted paraffin 1/8 inch thick before the jelly cools completely or cover the surface with a waxed tissue.

e. Store in a cool, dry place away from strong light. Tie the top of the jar with parchment to protect the wax from dust.

Evaluate the product:

Appearance: *transparent,* sparkling, translucent, cloudy, opaque, *quivers but does not flow, flows,* crystallization, weeping, burned, discolored, pale.

Texture: *firm but cuts easily, forms angles when cut, tender,* soft, gummy, rubbery

Palatability: *pleasing sub-acid flavor characteristic of the fruit,* strong flavor, burned, very acid, astringent, over-sweet

GUAVA JELLY

Assemble these utensils:

large saucepan
kitchen knife
chopping board
wooden spoon
2 utility plates
jelly bag
colander
measuring cups
2 bowls
2 custard cups
3 sterilized jelly glasses

Assemble these supplies:

1 kilo guava
1 pound sugar
1 tablespoon citric acid
1 tablespoon *kalamansi* juice water

For testing pectin content:

2 tablespoons denatured alcohol

Steps in preparation:

1. Wash and cut off stems and blossom ends. Boil for 5 minutes using 5 cups of water for every kilo of fruits.
2. Remove the water and set aside; mash the guavas with a wooden spoon. Return the water and boil again slowly in a covered saucepan for another 15 minutes.
3. Strain the juice with a moistened jelly bag. Twist the open end of the bag using only enough pressure to squeeze the juice but not the pulp. Second extracting can be done with the same procedure (1-3).
4. Test the juice for pectin by adding 1 tablespoon of fruit juice to two tablespoons of denatured alcohol in a custard cup.

   A fruit juice which is poor in pectin will form a stringy precipitate or may make the alcohol only cloudy. If a fruit juice is rich in pectin, a large mass will form.

5. Test the juice for acidity with a standard acid solution (1 tablespoon *kalamansi* juice and 1/2 cup water). Fruit juice which is less acid than the standard may be combined with a little fruit acid or commercial acid (citric acid or tartaric acid).
6. Add 2/3 to 3/4 cup of sugar per cup of fruit juice. The amount of sugar to use depends on the pectin content of the fruit juice. A fruit juice rich in pectin can be cooked with a higher ratio of sugar.
7. Combine fruit juice and sugar in the saucepan. Boil until sugar dissolves completely. Strain juice through a clean moistened jelly bag.
8. Boil the juice as vigorously as possible until jelly-point is reached. The jellying stage can be detected by the following tests:
    a. thermometer test — end point of jelly cooking ranges from 7.5° to 10.5°F above boiling point of water.
    b. sheeting test — at jellying point the solution falls by sheets, that is two drops combine at the edge of the spoon to form a sheet before falling.
9. Allow the bubbles to subside completely or when pouring the jelly into the warm jelly glass, it may be necessary to place a square of clean *sinamay* over the jelly glass to strain off the scum or bubbles.
10. Set aside to cool undisturbed. Pour melted paraffin before the jelly cools completely. Store jelly away from light.

SANTOL JELLY

Assemble these utensils:

large saucepan
kitchen knife
chopping board
wooden spoon
2 utility plates
jelly bag
colander
measuring cups
measuring spoons
2 bowls
2 custard cups
3 sterilized glasses

Assemble these supplies:

1 kilo santol
1 pound sugar
1 tablespoon citric acid
1 tablespoon *kalamansi* juice
water

For testing pectin content:

2 tablespoons denatured alcohol

Steps in preparation:

1. Blanch santol in boiling water for 5 minutes.
2. Cut crosswise, remove seeds and cut the pulp into small pieces 1/8 inch thick. Combine seeds and cut pulp.
3. Cover with hot water using two cups per quart of cut fruits.
4. Boil slowly for twenty minutes.
5. Strain through a jelly bag and test for pectin and acid as for guava juice.
6. The method of cooking and testing for jellying point is the same as guava jelly.

PAPAYA JELLY

Assemble these utensils:

- large saucepan
- kitchen knife
- chopping board
- wooden spoon
- 2 utility plates
- jelly bag
- colander
- measuring cups
- measuring spoons
- 2 custard cups
- 2 bowls

Assemble these supplies:

- 1 quart papaya pulp, grated or cut 1/8 inch thick and 1 inch square
- 3 tablespoons *kalamansi* juice
- 2 tablespoons citric acid
- 2 cups sugar
- water

For testing pectin content:

- 2 tablespoons denatured alcohol

Steps in preparation:

1. Combine papaya and 2 cups water, 2 tablespoons *kalamansi* juice and 1 tablespoon citric acid.
2. Boil 15 minutes.
3. Extraction test for pectin and alcohol, method of cooking and testing for jellying point are the same as guava jelly.

LABORATORY PROBLEM 31 Jams

GENERAL DIRECTIONS FOR FRUIT JAMS

1. Select the firm-ripe fresh fruit.

   Fresh, slightly underripe fruits rather than overripe ones are preferred. Preference is also placed on fruits rich in both pectin and acid such as: *santol, bignay,* sour guava, green tamarind, *carissa* and *lipote.*

2. Soften the fruit.

   Prepare the fruit as for other cooking purposes: remove stems, leaves, or deceased portions and rinse the fruit in cold water. Stone fruit may be left whole or stoned. If the flavor of the kernel is desired in the jam some of the stones may be cracked and the white kernel cooked with the fruit.

   Simmer the fruits gently for some time before the sugar is added to soften the skin and break down the cell-walls of the fruit to extract the pectin. Bring the fruit to a boil and then allow to simmer gently until reduced to a pulp. Fruits which break down readily like strawberries do not require the addition of any water, but strawberries may require simmering for 15 minutes before adding the sugar. For fruits requiring the addition of water, boil them down until the volume is reduced by about one-third before adding the sugar.

3. Add the acid.

   For fruits low in acidity, add acid before it is cooked as it helps to extract the pectin. Fruits which are deficient in acid are papaya, sweet varieties of guava, sweet varieties of mango (see list). The following quantities are suitable for addition to 4-pound fruit: 2 tablespoons *kalamansi* juice (approximately 1 average sized lemon) or

1/2 level teaspoon of citric acid or tartaric acid.

4. Best for pectin.

When the fruit has been simmered until the skin is softened, place in a cup or glass 1 teaspoon of juice which is as free as possible from seeds and skin.

Add 3 teaspoons of alcohol when it is cool.

Shake together gently and leave for 1 minute.

Note the clot formation: if a transparent, jellylike lump is formed, there is plenty of pectin in the fruit, if the clot is very firm and is broken into two or three lumps, the pectin content is moderate; if the clot is broken into numerous small pieces, there is very little pectin.

5. Add the pectin.

Add pectin to fruits which are deficient by blending with fruits rich in pectin such as papaya, or by adding fruit juice rich in pectin.

6. Add the required amount of sugar depending upon the pectin content of the fruit.

Add a smaller amount of sugar to fruits which have moderate amount of pectin than to those fruits which are very rich in pectin. The usual range suggested is 1/2 to 3/4 cup of sugar per cup of pulp.

Add the sugar when the skin of the hard fruits has thoroughly softened or else toughened at once and this mistake cannot be corrected. On the other hand, sprinkle sugar on soft fruits like strawberries overnight to keep them whole, if desired.

Do not add the sugar too early in the process for if the fruit and sugar boiled too long together, both the flavor and color of the jam are spoiled and skins may be toughened. Furthermore overboiling may cause a sticky jam.

7. Boil rapidly after the sugar has been added until the setting point is reached.

If the fruit has been well cooked and broken down before the addition of sugar, boiling should take only 3-20 minutes, according to the kind and quantity of the fruit.

Boil rapidly and adhere to the maxim of jam-making: "Cook slowly before adding the sugar and rapidly and quickly afterwards."

8. Test the setting point.

The setting point is usually attained when the added sugar is 60 per cent of the final weight of the jam. Underboiling results in less than this proportion, and may cause fermentation; overboiling, on the other hand, increases the possibility of the sugar crystallizing out. It is then when the sugar concentration is 65 per cent (60 per cent from the added sugar and the 5% per cent from the (fruit) that setting in jam occurs.

Determine the end points by the method discussed in the general directions for jelly making; the three tests which test the sugar concentration (the weight test, the volume test, and the temperature test) and the two tests which show when the jam will set out give an indication of the proportion of sugar in it (the sheeting or flake test, and the cold plate test).

9. Finish the jam.

    Remove the jam from heat immediately after it has reached setting point.

    Quickly remove the scum, if any, with a perforated spoon dipped in boiling water and wiped just before use.

    Pour the jam at once into perfectly clean, dry, and if possible, warm jars. Fill right to the top with hot jam to allow for the considerable shrinkage which takes place during cooking.

    For jams containing whole fruit, prevent the fruit rising in the jar by allowing the jam to cool in the pan until a thin skin begins to form. Then stir the jam gently and pour into the jars.

    Gently press a well-fitting waxed tissue or the surface of the jam in each jar and carefully wipe a clean cloth wrung out after dipping it in hot water. Tie down jars at once or protect by a clean cloth or paper until quite cold before covering.

10. Store jams in a dark, cool, airy place.

    Remember excessive heat or dampness may enhance mold growth.

Evaluate the product:

Appearance: *bright colored, darkened,* faded, burned

Texture and tenderness: *thick,* thin, flowing *smooth,* granular lumpy

Palatability: *characteristic fruit flavor,* rich, bitter, very acid, *slightly acid,* astringent, burned

GUAYABANO JAM (SOURSOP JAM)

Assemble these utensils:

waring blendor, if available; if not, use coarse sieve
chopping board
2 utility plates
measuring cup
2 bottles (sterilized)
kitchen knife
bowl
aluminum saucepan

Supply:

2 cups *guayabano* pulp
1 1/2 — 1 3/4 cups sugar

Steps in preparation:

1. Select fully ripe sound *guayabano,* remove seeds.
2. Pass thru a sieve or waring blendor to obtain a uniform texture.
3. Cook in a heavy aluminum pan, constantly stirring with a wooden spoon, until thick enough to be spooned out when mixture is lifted from pan.
4. Place in warm, sterile jars while hot and seal at once.

MANGO JAM

Assemble these utensils:

waring blendor, if available; if not, use coarse sieve
kitchen knife
2 utility plates
bowl
measuring cup
aluminum saucepan
wooden spoon
2 bottles (sterilized)

Assemble these supplies:

2 cups pulp of ripe mangoes
1 cup sugar (increase to 1 1/3 cups if pulp is sour

Steps in preparation:

1. Scoop out pulp and pass thru a sieve or waring blendor to obtain a uniform texture.
2. Measure pulp and combine sugar.
3. Cook in a heavy aluminum pan, constantly stirring with a wooden spoon, until thick enough to be spooned out when mixture is lifted from pan.
4. Place in warm, sterile jars while hot and seal at once.

Note:

Avoid iron knives and utensils during the preparation of this jam to prevent discoloration of the fruit resulting in a dark colored product.

PAPAYA JAM

Assemble these utensils:

waring blendor, if available; coarse sieve will also do
kitchen knife
chopping board
2 utility plates
bowl
measuring cup
aluminum saucepan
wooden spoon
2 bottles (sterilized)

Assemble these supplies:

4 cups ripe papaya pulp
3 1/3 cups sugar
1/3 cup *kalamansi* juice

Steps in preparation:

1. Select fully ripe sound papaya, remove seeds and scoop out pulp with a spoon.
2. Pass thru a coarse sieve or waring blendor, then measure.
3. Boil briskly in a smooth heavy aluminum pan or pressure boiler until thick enough for jam.
4. Add acid and sugar and continue boiling until thick and clear. Stir constantly to prevent scorching.
5. When the desired consistency is obtained pour into hot sterile jars immediately and seal.
6. Store in cool dark place.

PAPAYA-TAMARIND JAM (10 MINUTE JAM)

Assemble these utensils:

liquid measuring cup
2-quart saucepan
wooden spoon
2-quart mixing bowl
kitchen knife
waring blendor
2 8-ounce sterilized glass jar

Assemble these supplies:

1 cup papaya puree (passed thru a sieve)
1 cup tamarind pulp (soaked overnight with enough water to cover and then boiled to facilitate pulp extraction)
3 cups sugar

Steps in preparation:

1. Measure papaya and tamarind and mix well to get a homogeneous mixture.
2. Add sugar to the mixture.

3. Let it boil. After boiling, start timing for 10 minutes.
4. Pour immediately to the sterilized glass jars.
5. Seal, cool and store.

Yield: 2 8-ounce jars.

UBI JAM (PURPLE YAM)

Assemble these utensils:
- fruit or potato masher
- kitchen knife
- 2 utility plates
- bowl
- measuring cup
- aluminum saucepan
- wooden spoon
- 4 bottles (sterilized)

Assemble these supplies:
- 4 cups boiled, ground or mashed *ubi*
- 3 cups sugar
- 4 cups evaporated milk

Steps in preparation:
1. Combine all the above ingredients in an aluminum saucepan and cook over a low flame.
2. Cook until the mixture forms a soft ball in cold water which loses its shape when removed from the water.
3. Remove from fire and place immediately into hot sterilized jars.
4. Seal at once and store in cool dry place.

LABORATORY PROBLEM 32 **Paste Candies**

GENERAL DIRECTIONS FOR PASTE CANDIES

Fruit purees may be cooked with sugar and dried in a breeze to make delicious fruit confections. Almost any fruit or combinations of fruits may be used. Raisins, chopped nut meats, chopped candied fruits or peels may be added to enhance the flavor. The paste is cut into squares, rolled in granulated sugar and packed when ready.

PAPAYA PASTE CANDY

The candy cutter is essentially a roller with blades to cut the candy to the desired size.

Assemble these utensils:
- measuring cup
- measuring spoon
- heavy aluminum pan
- greased pan

Assemble these supplies:
- 1 quart pressed pulp of fully ripe papaya or papaya pomace
- 2 2/3 cups sugar
- 2 teaspoons citric acid (omit if acidified papaya pomace is used)

Steps in preparation:
1. Pare and remove seeds of a fully ripe papaya.
2. Press pulp thru a coarse sieve. Measure pulp and for every pint set aside 1-1/3 cups sugar. Do not add sugar at once.
3. Add 1 teaspoon citric acid to every pint of pulp. 2 2/3 tablespoons of *kalamansi* juice may be substituted if citric acid is not available.

4. Cook pulp with acid in a smooth heavy aluminum pan using a strong fire. Reduce the flame to medium if pulp is watery to prevent too much spattering. A small amount of butter may be added to the mixture to reduce the spattering. Stir constantly during the cooking. Defer the addition of sugar until mixture is as thick as jam to avoid getting a dark colored jam.
5. When jam consistency is reached, add measured amount of sugar and continue cooking until mixture is clear, thick enough to be rolled and no longer sticks to pan. Test paste in a saucer of tap water and stop cooking if it forms a soft ball which retains its shape even when removed.
6. Turn into a greased pan or smooth board greased with butter or any unsalted fat. Be sure to use good quality fat which will not impart any unpleasant flavor to the candy.
7. Let stand until cool and stiff. Cut into strips or any desired shape with a greased cutter.
8. Roll in sugar and wrap. Store in dry, clean jar.

PASTILLAS DE LECHE

Assemble these utensils:
wide bottomed pan
measuring cup

Assemble these supplies:
4 cups fresh carabao's milk, undiluted
6 tablespoons sugar, rind of 1 lemon

Steps in preparation:
1. Place the milk in a wide bottomed pan and heat over *low* heat.
2. Stir until the milk has evaporated to one fourth its original quantity.
3. Add sugar and rind and continue cooking over low heat, stirring constantly, until the mixture forms a soft ball.
4. Pour the paste on a sugared board, cut into 2 inches x 1/4 inch pieces, roll in sugar and wrap in fringed white tissue paper or any suitable paper.

SQUASH PASTE CANDY

Assemble these utensils:
Chopping board
knife
12-quarts kettle
vegetable masher
set of mixing bowl
2 trays
2 spoons
rubber scraper
set of measuring cup
set of measuring spoon
kilogram weight
2 wooden spoons
2 2-quarts, smooth, heavy aluminum pan
smooth wooden board
candy cutter
2 dish towels
glass jar
5 plastic bags
4 cellophane wrappers, assorted colors
pair of scissors

Assemble these supplies:
1 kilogram squash puree (4 cups)
3/4 kilogram sugar (3 cups)
2 tablespoons butter

Steps in preparation:
1. Cut whole squash into four pieces and remove the seeds.

2. Cook in boiling water start until it can be mashed into a puree.
3. Drain off water from the squash and cool. Pare and cut into small pieces and press through a vegetable masher.
4. Weigh one kilogram of the squash pulp and add 1/2 kilogram of granulated sugar. Mix well until blanded.
5. Pour the mixture into a thick aluminum pan, add butter and cook over medium heat, stirring constantly until it reaches the jam consistency.
6. Add the weighed 1/2 kilogram sugar and continue cooking. Add the lemon rind. The paste candy is done when it no longer sticks to the pan or can be rolled into a ball as indicated by the water test. If cooking temperature seems high, make the necessary adjustment to prevent scorching.
7. Turn onto a smooth board greased with butter. Level to 1/4 inch thick. Allow to cool and cut with buttered candy cutter.
8. Roll in sugar. When sufficiently cool, wrap in cellophane paper and store in a plastic bag and place inside a dry, clean air tight glass jar.

Yield: 100 pieces (1" x 1/4" x 1/2")

TAMARIND PASTE CANDY

(Tama-yam Candy or Tamarind Champuy)

Assemble these utensils:

- fruit or potato masher or coarse sieve
- kitchen knife
- measuring cup
- aluminum saucepan
- 3 utility plates
- wooden spoon
- custard cup with cold water
- measuring spoon
- wax paper

Assemble these supplies:

- 1/2 cup tamarind pulp or puree
- 1/2 cup boiled and mashed yellow sweet potatoes
- 1 cup sugar

Steps in preparation:

1. Select tamarind which is ripe and fleshy. Shell and break into pieces or buy those which are sold already shelled and in mounds.
2. Place in saucepan and add enough water cover. Boil until most of the pulp has separated from the seeds stirring often to facilitate separation.
3. Pass thru a coarse sieve and discard residue.
4. Measure the mash and tenderized yellow sweet potatoes and tamarind puree and sugar.
5. Combine the tamarind and potato and cook mixture until thick as jam with constant stirring over a strong fire.
6. Add the sugar and cook further until the mixture no longer sticks to the pan. Regulate flame to prevent scorching of mixture. It should form a soft ball in water

and retains shape even when removed.

7. Cool in a pan of cold water.
8. Form into balls using the 1 teaspoon measure to insure uniform pieces and manipulate in greased palms.
9. Cool balls completely then roll in sugar and wrap.

LABORATORY PROBLEM 33 Marmalades

GENERAL DIRECTIONS FOR MARMALADES

Marmalades differ slightly from jams. Jams are made from crushed fruit while true marmalades contain pieces of fruit suspended in a clear sparkling jelly. The best known marmalades contain citrus fruits such as oranges, lemons, limes and grape fruit but many delicious marmalades are made from other fruits and combinations of fruits such as guava, pineapple and papaya.

1. Wash the fruits well in clean water.

   Scrub with a clean brush if the skins are at all dirty. To peel fruits more easily, soak fruit in boiling water for 1 or 2 minutes.

2. Cut up the fruit.

   Slice the peel finely so that pectin can be more readily brought into solution. If marmalades with very little pith are desired, cut the peel finely, then do not discard the pith. Instead, cut it up roughly, tie it loosely in a piece of muslin and cook with the peel until just before the sugar is added. This is done because most of the pectin or jellying material is found in the rind and the pith. Squeeze the bag and remove it. Now all the pectin has been extracted.

3. Soak the fruit to help soften it.

   This step may be omitted provided the pulp and peel are cooked for a slightly longer period.

4. Cook the fruit until the peels are softened.

   Before adding the sugar, make sure that the fruit has been sufficiently cooked to extract the pectin and soften the peel. The fruit may be cooked in its own juice or with a little water, depending on the juiciness of the fruit, the method of cooking, and the pan used. Fruits which break down easily do not require the addition of any water. Add only enough water to prevent burning. Add more water when a deep pan is used. Use less water in proportion when increasing the quantities in a recipe. Furthermore, ripe fruits will require less water for softening and cooking. Cook till the fruit is broken down and the skins are soft.

5. Add the acid.

   Supplement the natural acid of the fruit by adding lemon juice, citric or tartaric acid.

6. Test for pectin.

   Apply the test for pectin when the peels are quite soft. In general, however, the pectin content of citrus fruits is more stable than that of jam fruits.

7. Boil the pulp and sugar.

   Add the sugar only when the peel is quite soft and the excess water boiled off. After the sugar dissolves, boil the marmalade rapidly until the setting point is reached.

8. Test for the setting point according to the methods suggested in jelly experiment.

9. Finish the marmalade.

   Remove the scum as soon as the marmalade has reached setting point or else the scum will cling to the peels. Allow the marmalade to cool little in the pan before pouring into warm jars to prevent the peel rising. Put wax circles on surface while the marmalade is hot, but cover only when it is cold.

Evaluate the product:

Appearance: *thin. slices of fruit suspended throughout the jelly,* fruits all at the bottom, fruits floating on the surface, jelly is *transparent, sparkling,* translucent, cloudy, opaque, *quivers but does not flow,* crystallization on the surface, weeping.

Texture: *cuts easily, firm, forms angles when cut,* sirupy, tough, gummy, rubbery

Palatability: *characteristic tangy flavor,* sweet enough, piquant taste, strong flavor, burned, very acid, astringent, very bitter, slightly bitter, oversweet.

GUAVA MARMALADE

Assemble these utensils:

saucepan
wooden spoon
measuring cups
measuring spoons
kitchen knife
chopping board
sterilized jars

Assemble these supplies:

3 cups guava pulp (cooked with little water and passed thru a coarse sieve)
3 cups sugar
juice of 2 lemons

Steps in preparation:

1. Take quite overripe guavas, slice, place with a little water in kettle.
2. Cook until soft with constant stirring; pass thru a coarse sieve.
3. Measure, then add sugar and lemon juice.
4. Cook all together until thick, stirring constantly to prevent scorching.

   Use a medium flame.
5. Pour into hot sterilized jars and seal at once.

ORANGE MARMALADE

Assemble these utensils:

- kitchen knife
- chopping board
- measuring cups
- saucepan
- bowl
- 2 sterilized jars

Assemble these supplies:

- 4 oranges, sliced (measures 2 cups)
- 3 lemons (measures 1 1/2 cups)
- 3 1/4 to 3 1/2 cups sugar

Steps in preparation:

1. Add 6 cups of water to the sliced fruit and let stand overnight.
2. Next day, cook mixture until tender (about 30 minutes).
3. Let stand for another night. On the third day, add 2 cups sugar for each pint of fruit.
4. Cook without draining the water to jelly stage (about 10 minutes).
5. Pour into hot sterile jars. Seal while hot.

PAPAYA-PINEAPPLE MARMALADE

Assemble these utensils:

- food chopper
- measuring cups
- measuring spoons
- chopping board
- saucepan
- wooden spoon
- utility bowl
- sterilized jars

Assemble these supplies:

- 1 ripe papaya, put thru a coarse food chopper
- 1 ripe pineapple, put thru a coarse food chopper
- 1 teaspoon green ginger (sieved fine) to each cup of ground papaya and pineapple
- 1 cup sugar for each cup of the combine pulp

Steps in preparation:

1. Combine fruits and ginger.
2. Boil gently for 10 minutes.
3. Cook mixture by boiling briskly and constantly stirring to prevent burning.
4. Cook until the mixture is clear and as thick as desired.
5. Pour piping hot into hot sterile jars and seal at once.

LABORATORY PROBLEM 34 General Directions for Preserves

Preserves are fruits or combinations of fruits cooked in sirup until the fruit is clear, tender, and transparent. The secret of the preserve is in the slow impregnation of the fruit with the sirup. Juice from the fruit is drawn out by a process known as osmosis and sirup takes its place. A thin sirup should be used for fresh fruits at the start so that the fruit will not shrivel and become tough. General method:

1. Select firm-ripe fruit in perfect condition. Soft-ripe fruits will disintegrate by the prolonged treatment.

2. Prepare the fruit as you would for other cooking purposes, slicing large fruit if desired.

   Have fruits cut uniformly whether they be left whole, halved, quartered, or sliced. The pieces will thus require the same length of time and the finished preserve will be more attractive.

3. Drop the fruit into boiling sirup and cook rapidly over a hot fire until the fruit is clean and tender.
   a. Prepare the sirup. See table 15. The amount of sugar usually needed is 3/4 to 1 pound per pound of fruit. The sugar may be added in a variety of ways depending on the type of fruit used.
      1) sprinkle *juicy fruits* and berries with sugar and let stand overnight. The sugar is then drawn out of the fruit juice making enough liquid to form a sirup without the addition of any water.
      2) *cook juicy fruits with firm skins* directly in medium sirup. As the cooking continues, the juice thins the sirup to the right degree to allow the sirup to enter the cells.
      3) put *firm fruits* into a thin sirup to give time for softening before the sirup becomes too concentrated.
      4) *place acid or sour fruits* directly into heavy sirup. Some of the sugar is inverted and in this form will not crystallize readily.

   The general rule is "The sweeter the fruit, the thinner the starting sirup."

   To make the sirup, dissolve the sugar in the water, bring to a boil, and boil rapidly for 5 minutes. Strain all sirups before using.

TABLE 15. STARTING SIRUPS FOR PRESERVES

DENSITY (DEGREES BALLING)	AMOUNT OF SUGAR PER 2 QUARTS OF WATER	CHARACTERISTICS OF FRUIT	CHARACTERISTICS OF SIRUP
10	1 cup (200 grams)	very thin	very sweet or very hard
20	1 3/4 cups (350 grams)	thin	medium sweet or medium hard
30	3 1/4 cups (650 grams)	medium thin	sweet or slightly soft
40	5 1/4 cups (1050 grams)	medium thick	slightly sour and soft
50	8 cups (1600 grams)	thick	sour and soft
60	12 cups (2400 grams)	very thick	very sour

b. After the sirup has come to boil, test the density.

Use either a Brix or a Balling saccharometer. The Brix spindle has finer graduation and is slightly more accurate than the Balling spindle.

Fill a 250 ml. cylinder with water deep enough to float the spindle of either a Brix or Balling hydrometer until the reading at the surface of the liquid is zero. The spindle rises as the amount of sugar increases and the reading indicates the percentage of sugar in the sirup. Cool liquid to the temperature indicated at the side of the spindle or correct readings according to the temperature used. Correction tables are available.

c. Add boiling water, if necessary. Should the sirup become too thick add 1/4 to 1/2 cup boiling water at a time, depending on the amount of sirup, until the desired thickness is reached.

d. Be sure the fruits are at all times covered with sirup, if not the exposed pieces will dry on the surface and shrivel before enough sirup has entered the pieces to plump them.

e. Cook rapidly to insure a sparkling and bright preserve. Slow cooking produces a dull dark, unattractive product.

4. Continue to cook the fruit until it is tender and glistening. This means that the fruit juice in the cells has been absorbed by the sirup. The sirup may be allowed to thicken as it boils with the fruit or the sirup may be concentrated by alternate cooking and resting periods. The latter method improves the preserve because it gives the fruit a chance to plump and the sirup to thicken by evaporation of water in it.

5. Cool rapidly and plump the preserves.

Use shallow enamel trays or pans and run cold water underneath them to cool the preserves more rapidly. This preserves the color and flavor better than when the fruits are picked hot.

The plumping period allows the sirup to permeate the fruit. If successive heating and cooling is carried on gradually, there is no danger of shrinking the fruit.

6. Pack the preserve.

a. Heat the sirup in which fruits have been standing until the thermometer reaches 222 to 226°F. The packing sirup must be thick, with a density of 50 to 60° Balling on a saccharometer.

b. Pour the boiling sirup over the attractively packed preserves to remove air bubbles. Process the jars for about 20 minutes in simmering water (180° to 190°F) to guard against molds or simply cover the surface of the preserves with melted paraffin before capping the jars.

7. Label and store in a cool dark, dry place.

Helpful hints:

To make each jar unique and distinct, add your own touches. Brighten up pale preserves by adding a few maraschino cherries or a half cup of raisins or nutmeats a couple of minutes before removing the preserves from the fire. Add zest to blend fruits by substituting pineapple juice or orange juice for jar of the water. Point up the flavor of your preserves with grated orange nutmeg or also thin spices like cinnamon or ginger, clove or allspice in a bag and cook with the preserve. Flavor properly concentration packing sirup, or port. To make pickled preserves or pickled fruit, substitute vinegar for one fourth to one third of the water used to make the sirup.

Evaluate the product:

Appearance: fruit — *plump, clear, glistening,* mellow, dull, dark, unattractive, *retains its shape,* shriveled, shrunken, disintegrated, faded

sirup — *thick,* jelly like

Texture: crisp, chewy, tough, soft, tender, leathery

Palatability: *characteristic fruit flavor,* burned, *pleasingly sweet,* sour, bitter

GUAVA PRESERVE

Assemble these utensils:

- kitchen knife or peeler
- tablespoon
- measuring cup
- saucepan
- bowl
- chopping board
- 2 sterilized jars
- big kettle with rack

Assemble these supplies:

- 1 kilo firm ripe guavas
- 2 cups sugar

Steps in preparation:

1. Wash and cut off stems and blossom ends. Pare thinly with a sharp knife or peeler. Place fruits in a pan of water after peeling to prevent discoloration.
2. Cut each fruit into halves and scoop out the seeds with a spoon. Set aside.
3. Prepare sirup using 2 parts sugar to 1 part water by volume. Have enough sirup to have all fruits completely immersed. Bring to boil.
4. Add fruit halves to boiling sirup and simmer in open saucepan until the fruit is almost translucent. This takes about 10 minutes.
5. Allow guavas to stand in sirup overnight. Weigh down with cups or saucers over wax paper to have all fruits completely immersed.
6. Next day, drain sirup from fruit. Add sugar to sirup using 1/2 of the amount originally used to cook the fruit. Dissolve the sugar by stirring and bring to boil.
7. Return the fruit to the sirup and simmer for 5 minutes.
8. Soak for another night.
9. Next day, drain sirup from fruit as before. Boil the sirup until thick.
10. Fill sterilized glass jars with the drained guavas making an attractive pack.

11. Pour boiling sirup immediately into filled jars. Place a pad or cloth under the jar to prevent breakage. Seal.
12. Process in hot water bath for 20 minutes counting time when the water is at *rolling boil.*

KAONG IN SIRUP

Assemble these utensils:

utility bowl
saucepan
measuring cups
2 sterilized jars
measuring spoons
tablespoon

Assemble these supplies:

3 cups *kaong*
3 cups sugar

Steps in preparation:

1. Soak *kaong* in several changes of water to remove its acid flavor.
2. Drain. Boil water and pour into *kaong,* then rinse in fresh water. Set aside.
3. Prepare a thin sirup using 1/2 cup sugar and 1/2 cup water for every cup of *kaong.* Boil sirup then add *kaong* and simmer for 5 minutes.
4. Soak *kaong* in sirup overnight having all the pieces soaked or fully immersed.
5. Drain *kaong,* then add another half cup sugar per cup of *kaong* to the sirup. Bring the sirup to a boil, then add *kaong.* Simmer for 5 minutes.
6. Pack *kaong* into sterile jars immediately; pour boiling sirup and seal at once.

MACAPUNO BALLS

Assemble these utensils:

saucepan
tablespoon
2 utility plates
measuring cups
meat grinder
measuring spoons
2 sterilized jars

Assemble these supplies:

1 medium *makapuno*
2 cups sugar

Steps in preparation:

1. Boil 1 medium *makapuno* for one hour until the meat is soft and can be easily scooped out with a spoon.
2. Break the *makapuno* into two and scoop out the meat. Grind thru a meat grinder which has been previously cleaned well in boiling water.
3. Form finely ground *makapuno* into balls, placing balls side by side on a plate. Use the 1/4 teaspoon measure to get uniform balls.
4. Prepare a thin sirup using two parts sugar and 1 part water. Boil sirup until almost thread stage. Add the balls carefully to prevent loss of shape and simmer for 5 minutes. Soak overnight in this sirup weighing down all pieces with a saucer.
5. Next day, drain the sirup. Bring sirup to boil, then add the *maka-*

puno. Heat further until the sirup resumes boiling.

6. Pour at once into hot sterilized jars. Place uniform amounts in all jars to be used. Seal while hot.

SANTOL PRESERVE

Assemble these utensils:

saucepan
paring knife
chopping board
measuring cup
bowl
2 utility plates
2 sterilized jars

Assemble these ingredients:

1 kilo sound ripe santol
2 cups sugar
rice washing or starch water

Steps in preparation:

1. Boil water to blanch santol. Drop santol in boiling water and allow them to stay there for 8 to 10 minutes. Plunge into a pan of cold water for easier handling.
2. Pare santol. Dip at once in starch water or rice washing to prevent discoloration and to remove astringent taste.
3. Cut pared santol into halves forming scalloped edge if desired. Removed seeds from pulp. The seeds can be used to extract juice for beverage.
4. Keep the santol immersed in starch water for 30 minutes after all the fruit has been cut and seeded.
5. Rinse fruit thoroughly and cook in sirup using 1 cup water to 1 cup sugar. Prepare another sirup to have all fruit immersed.
6. Bring sirup to boil, add the fruit and boil gently until the santol is tender and almost translucent. This takes about 30 minutes.
7. Remove from heat. Soak in sirup overnight. Have all the fruits completely immersed.
8. Next day, drain sirup from fruit. Add sugar to the sirup using 1/2 the original amount used to cook the fruit. Dissolve the sugar and boil gently for 2-3 minutes.
9. Return the fruit to the sirup and simmer for 10 minutes. Soak again overnight. Repeat steps 7-9 until fruit is translucent, plump, and the sirup very thick.
10. When ready to pack, drain the sirup from fruit. Fill clean jars with the drained fruit.
11. Bring sirup to boil and pour at once into filled jars. Insert a knife to remove air bubbles. Seal at once.
12. Process in boiling water bath for 15 minutes.

PRESERVE SANTOL FOR PIE

1. Follow steps 1 to 4 in the preparation of santol preserve. It is not necessary to soak pieces in several changes of starch water.
2. Slice santol halves into small uniform pieces for pie, around 10 to 16 pieces in every santol half.

3. Measure cut fruit. Do not pack in cup. For every 2 cups of pulps use 3/4 cup water and 3/4 cup sugar.
4. Bring sirup to boil, then add fruit and boil gently until the fruit is tender and almost translucent. This takes about 20 minutes.
5. Pack into hot sterilized jars right after boiling and seal at once. When Ball or Mason jars are used, turn back 1/4 inch and complete the seal after processing.
6. Process in boiling water bath for 20 minutes.

If santol pieces are to be used in pie on the same day, just follow procedure from steps 1 to 4.

CRISP WATERMELON RIND PRESERVE

Assemble these utensils:

kitchen scale
measuring cups
kitchen knife
chopping board
1-quart saucepan
kitchen tongs
2 utility bowls
utility plate
4 8-ounce clean sterilized jars

Assemble these supplies:

1 medium watermelon
1 lemon
2 cups sugar
4 cups water
ginger root, optional

Steps in preparation:

1. Cut the red portion of the melon from the rind and remove the green outer skin.
2. Cut the white rind into one inch pieces and soak them for 3 hours in lime water made by dissolving 1 tablespoon slaked lime in each quart of water needed to cover the rind.
3. Drain and let the rind stand in fresh cold water for one hour, changing the water several times.
4. Drain and cook in fresh water for 1 1/2 hours, or until tender.
5. Drain and weigh the rind.
6. For every 3 pounds watermelon rind (8 cups) make a sirup of 2 cups sugar, 1 cup water, and the juice of 1 lemon and bring to a boil.
7. Add the watermelon rind and if desired, 4 small pieces of ginger root and boil gently for about 1 hour.
8. Add 1 lemon, thinly sliced, and continue to cook until the rind is transparent and the sirup is as thick as honey. If the sirup gets too thick before the rind is clear, add boiling water, 1/2 cup at a time.
9. Let stand for several hours to a boil, and pack hot in hot jars. Seal at once.

Yield: 4 8-ounce glass jars.

LABORATORY PROBLEM 35 Candied, Crystallized and Glazed Fruits

GENERAL DIRECTIONS

1. Prepare the fruits.

   Choose the fully ripe, firm and sound fruits. Too soft fruits will not retain their form during lengthy process.

   Drain fruits. As soon as they are cut add either 1/2 teaspoon ascorbic acid or 1 tablespoon salt for each 2 quarts water.

   It is best to work with not more than about 2 pounds of fruit in one batch although it is possible to work on several batches or batches of different fruits at one time.

2. Cook the fruits gently in just enough water until it is just tender.

   The length of time of cooking will depend upon the kind and maturity of the fruit used. Tough fruits may call for 10-15 minutes cooking while most fruits require only three to five minutes parboiling. This cooking period modifies the texture of the fruit to make it absorb the sirup without shriveling. Time of cooking has to be regulated because too much cooking spoils the shape and texture of the fruit while too little cooking results in slow penetration of the sugar which darkens tough fruit.

3. Drain fruits well and cover with the cooled starting sirup of 30 - 34 degree boilings, then bring to a boiling point and set aside to cool and plump.

   Keep the fruits completely submerged in the sirup at all times with the help of a dinner plate or clean hardwood card to prevent the fruit from becoming dry, hardened, and disclosed.

   If different fruits are being plumped do this in separate batches or else their flavors and aroma may intermingle.

4. Soak and plump the fruits according to Table 16.

TABLE 16. PLUMPING OF FRUITS

Concentration of Sirup (Degrees Balling)	*Time for Soaking Fruit in the Sirup*	*Addition of Sugar for Increasing the Density for Each Soaking*
35°	24 hours	1st day
45°	24 hours	2nd day — 2 oz. sugar
47°	36 hours	3rd day — 2 oz. sugar
52°	36 hours	5th day — 2 oz. sugar
57°	48 hours	8th day — 3 oz. sugar
65°	48 hours	10th day — 4 oz. sugar
70°	72 hours	12th day — 4 oz. sugar

If a hydrometer is available, drain off the starting sirup and add sugar or a combination of corn sirup and sugar to increase the density according to the table. Between each plumping period, boil the sirup to dissolve the sugar and then test with the hydrometer. Adjust the density by adding water if it is too great (about 2 tablespoons of water will reduce the density approximately one degree).

Increase the density by boiling the sirup to evaporate some water or add more sugar. Retest the sirup density, and add sirup to the fruit, bring to a boil and allow to stand as required.

If a hydrometer is not available, drain off the starting sirup and measure. Add one cup of sugar or one-half cup of sugar and one-half cup corn sirup to every quart of sirup. Heat the sirup to dissolve the sugar, add the fruit and heat boiling point. Boil for 3 to 4 minutes. Allow to stand as required.

Increase concentration until the sirup is very thick, like extracted honey. This is a sirup which registers 228° on a candy thermometer.

5. Store in final sirup to plump.

   Soak the fruit in thick sirup for 3 days or longer. The fruit will keep in heavy sirup for 2 to 3 weeks. Should there be any signs of fermentation, or molding, heat the fruit and sirup to boiling for 2-3 minutes. Heat sirup also to dissolve any crystal of cane sirup which may appear.

6. Dry candied fruits.

   Drain the fruit in a colander, save the sirup and dip colander and fruit into simmering water for 3 seconds to remove the surface sirup. Allow the pieces of fruit to dry on cake racks.

   To reuse the sirup for candying, dilute 3 parts of the sirup with 1 part water and begin again with step 2.

   Dry the fruit until no sirup extracts from the center of the fruit. Dry in the sun to preserve the natural color, or dry indoors. The latter can be done by placing fruits on the racks of a cool oven (100°F) for 8 to 10 hours. Leave the oven door open to improve ventilation. Another alternative is to dry the fruits at room temperature for 2 to 3 days.

7. Finish candied fruits.
   a. Crystallized finish. Before the fruit is completely dry, roll each piece in granulated sugar and complete the drying.
   b. Glazed finish. Make fresh sirup consisting of 1 pound of sugar dissolved in 1/2 cup water, giving a sirup of 75° Brix at 100°F and bring to a boil. Quickly dip pieces of candied fruit into it with a fork or skewer and then place on a tray. Use a fresh portion as soon as the sirup becomes cloudy. Keep bulk of the sirup hot and tightly cover with a damp cloth or tight-fitting lid. This is done to prevent evaporation. After dipping all the pieces, place in oven with temperature not to exceed

120°F. Carefully turn the pieces during the process so that they will become dry on all sides.

8. Wrap each piece in wax paper.

Pack in cardboard or wooden boxes, lined with waxpaper to prolong the shelf life of candied fruits. Remember that candied, glazed or crystallized fruits do not keep for over 3 months.

Evaluate the product:

Appearance: *whole,* disintegrated, *characteristic color of the fruit,* discolored, *evenly colored throughout,* darkened.

Texture: *chewy or crisp,* fibrous, mushy, rubbery, *tender but firm*

Palatability: *pleasingly flavored,* *bitter,* burned, medicinal, astringent, sour

CANDIED KONDOL

Assemble these utensils:

Brix hydrometer, if available
kitchen knife

Assemble these supplies:

fresh ripe *kondol*
sugar
citric acid
0.15% lime solution
flavoring and coloring, if desired

Steps in preparation:

1. Pare the *kondol;* cut into quarters and scoop out the seeds and pulp.
2. Slice the rind into 1/3 inch thick and cut into desired shapes using a fruit decorator.
3. Soak the fruit for 12-15 hours in a 0.15% lime solution to make the fruit firm.
4. Wash thoroughly in fresh water and soak for 15 minutes in 3 changes of water.
5. Boil the fruit for 15 minutes to make it tender and translucent. This makes the fruit more permeable to the sirup and this removes excess lime.
6. Make a 25° Brix sirup plus 1/4 teaspoon citric acid to *invert the sugar.* (Acid is added to prevent formation of sugar crystals. It also improves the flavor and gives it a tang. Other acids that may be used are lemon juice, *kalamansi* juice and tartaric acid.) Make enough to cover the fruit in the saucepan, and boil for 5 minutes. Store the fruit in sirup for 24 hours. Food coloring may be added at the first siruping.
7. Make subsequent boiling at 24 hour intervals for 5 minutes. Drain the sirup and increase the concentration by 10 degrees everyday until it reaches the 74°Brix. Add 1/4 teaspoon citric acid for every 10 degrees rise in sugar concentration.
8. Store in the final sirup of 74° Brix for 2 weeks to permit the fruit to become plump. *Kondol* may then be packed in jars. *Kondol* may be dried after 24 hours storage in 74°Brix.

9. Dry after storage, remove the sirup and dip the fruit in boiling water to remove the adhering sirup. Arrange in racks and dry under the sun or in an oven at 120-130° F for 4-6 hours or until desired texture is obtained.

CANDIED ORANGE PEEL

Assemble these utensils:

measuring cup
measuring spoon
kitchen knife

Assemble these supplies:

peel from 3 oranges
1 tablespoon salt in 4 cups water
2 cups sugar

Steps in preparation:

1. Scrape pulp from peel of 3 oranges. (You will get neater petals if oranges are cut lengthwise).
2. Cover peel with 1 tablespoon salt in 4 cups water. Weigh down with plate to keep peel under water; let stand overnight.
3. Drain and wash thoroughly. Now cover with cold water; heat to boiling. Drain. Repeat this three times. This helps take away bitter taste of peel. With kitchen scissors, cut out into petal shaped strips.
4. Put 2 cups peel into a saucepan; add 2 cups sugar and 1/2 cup water. Stir until sugar dissolves.
5. Cook slowly till peel is translucent, about 30 minutes.
6. Drain; roll in granulated sugar.
7. Dry on cake rack. Place paper under cake rack to catch the drip.

Helpful hints:

Arrange sugar orange - peel petals around a center of red and green large size gum drops for a gala snack tray. Put on the buffet or coffee table for nibblers going by; pass the sweets when the crowd drops in.

CANDIED TAMARIND

Assemble these utensils:

aluminum or glass pan
saucer or plate to weigh
down fruits
waxpaper

Assemble these supplies:

long, plump, sour tamarind
thin sirup (1 part sugar to 1 part
water)

Steps in preparation:

1. Select, long, plump, sour tamarind. Remove the shell carefully to retain the natural shape of the fruit. Retain the stem but cut it if it is more than one inch long. Do not wash. Set aside.
2. Prepare a thin sirup using 1 part water. Prepare enough sirup to completely immerse the tamarind. Stir to dissolve the sugar and bring to boil without any further stirring. Boil the sirup only to completely dissolve the sugar. Boiling may be extended from 1 to 2 minutes. Cool over a basin of cold water before adding to tamarind.

3. Place the tamarind carefully in a bowl, an aluminum or glass pan. Pour the sirup and weigh down the fruit with a dinner plate or saucer to have all fruit completely immersed in the sirup. Place waxpaper first, then put on the weight. Soak shelled tamarind in this sirup for three to four days. The sirup will be very sour after soaking since most of the acid is extracted from the fruit and is replaced by the sugar.
4. Remove the sirup from the fruit and prepare another batch using 2 cups sugar per cup of water.

   The first sirup which is very sour need not be thrown away, it may be used for subsequent making of candied tamarind as first sirup but add 2 cups sugar per quart of this sirup. It may also be fermented to make into either wine or vinegar. Another use for it is to serve with crushed ice as beverage.

   Prepare enough sirup to have all pieces immersed. Proceed as in the first sirup, cooling it first before combining with the drained fruit. Soak the tamarind for 2 to 3 days in this second sirup. It may be necessary to alter the position of the tamarind every two days during the soaking period to have all parts of the fruits sweetened. Taste the tamarind after this second soaking and if the desired sweetness has been reached, drain the sirup. If it needs to be sweetened some more, add 1 cup sugar for every pint of the second sirup, bring to boil then cool completely. Soak the tamarind in third sirup. Soak one or two days more.

   If during any of the soaking periods, the slightest trace of fermentation, molding, or crystallization occurs, drain the sirup from the fruit and bring to boil. Cool, then return to the fruit. *HAVE ALL PIECES COMPLETELY IMMERSED IN THE SIRUP AT ALL TIMES.*
5. Candied tamarind is finished by draining all sirup completely from each fruit. Lay drained fruit on clean cake racks with a tray underneath, to catch any dripping sirup, or use screen trays or window screens tacked on wooden frames. Dry under the sun for two whole days or place in a warm oven 150°F for 30 minutes for two days until desired texture is reached. Store in cold oven or over a tray or pan of water overnight until drying is accomplished.
6. The candied tamarind will be slightly sticky and chewy after the drying process. Store by wrapping each fruit in white cellophane paper. Arrange in boxes or candy jars. Keep away from very warm or damp corners.

CANDIED WATERMELON RIND

Assemble these utensils:

kitchen knife
chopping board
sterilized jars
bowl
measuring cups
measuring spoons
hydrometer, if available

Assemble these supplies:

1 quart watermelon rind
1 bottle corn sirup
1 pound sugar
1 tablespoon citric acid
brine solution

Steps in preparation:

1. Pare watermelon lightly; remove pulp and seeds.
2. Soak in a brine solution (1 cup water and 1/8 cup salt). Soak overnight.
3. Next day, wash thoroughly and boil in water until soft or can be easily pierced with a fork about 60 minutes.
4. Prepare a thin sirup consisting of 3 cups water and 1 cup corn-sirup. Soak the boiled rind in this sirup. Let it stand overnight.
5. Next day, drain the sirup and add again identical amounts of corn sirup added in the thin sirup.
6. Return the fruit to the blended sirup and boil the mixture from 2 to 3 minutes. Store overnight.
7. Increase at 24 hour intervals the sugar concentration using a hydrometer or Balling to 50°, 60° and 75° on successive days. 1 cup sugar + 1/2 cup water + 1/4 teaspoon acid can be substituted for 1 cup sirup.
8. Store the fruit in the final sirup (75°) for at least 2 weeks to permit the fruit to become as plump as possible.
9. Dry on screen trays under the sun or in a warm oven (200°F) for 1 hour every day until the desired texture is attained. This will usually take from 4 to 6 hours.
10. Pack in candy boxes or in sterilized jars after drying.

REFERENCES

1. Alandy Dy, F. *Procedure of Candied Condol.* U.P. College of Home Economics. Unpublished.
2. Anonymous, "Domestic Preservation of Fruits and Vegetable." Ministry of agriculture. *Fisheries and Food Bull. No.* 21. Her Majesty's Stationery Office, London.
3. Brown, M. 1955. *Pickles and Preserves.* Wilfred Funk, Inc. N.Y.
4. Cruel, C.P., *pH and Pectin Determination of Ten Philipipne Fruits. U.P.* B.S.F.T. thesis. Unpublished, 1962.
5. Cruess, W.V., *"Commercial Fruit and Vegetable Product"* 4th ed. (New York: McGraw Hill Book Co., Inc., 1958).
6. Desrosier, N.W., *The Technology of Food Preservation.* (Connecticut: Avi Publishing Co., Inc., 1959).
7. Gonzales, O.N., J.G. Palad, and A. Brillante, "Comparative Analytical Data on Some Philippine Fruits." *Philippine Journal of Science* 92(1):17-34.
8. Griswold, R., *The Experimental Study of Foods,* Rev. ed. (Boston: Houghton Mifflin Co., Inc., 1962),
9. Guzman, M.P., *Laboratory Procedures for Food Preservation.* U.P. College of Home Economics. Unpublished.
10. Guzman, M.P., *Principles of Cooking.* A manual on laboratory

procedures in food preservation. U.P., Q.C.

11. Malcolm, O.P., *Successful Canning and Preserving.* Practical handbook for schools, club, and home use. J.P. Lippincott Company, Philadelphia, 1930.
12. Mendoza, J.M., *Philippine Foods, Their Processing and Manufacture.* (Philippines, 1961.)
13. Orosa, M.Y. 1962. *Preservation of Philippine Foods* (Manila: Bureau of Printing, 1926).
14. Perez, E.D., *Recipes of the Philippines* (Quezon City, Philippines: Capitol Publishing House, Inc., 1960).
15. Rauch, G., *Jam Manufacture* (London: Leonard Hill Limited, 1950).
16. Serrane, A., *The Complete Book of Home Preserving* (New York: Doubleday and Company, Inc., 1955).

SECTION ELEVEN

Introduction to Canning

A shelf full of home canned foods can be the pride of any home. Home canning makes possible better menus for the family. It saves time and money; it supplies the family with convenience items; it extends the seasons of fruits and vegetables; it lengthens the shelf life of meat and fish. Then, in the final analysis, who can measure the satisfaction that comes with a well preserved food?

Easy to can when you know how!

Here are the 7 POINTS TO SUCCESS IN FOOD PROCESSING:

1. *Select your products.* Preserve only fresh foods in their prime quality.
2. *Check your equipment.* Be organized and systematic. Have everything on hand before you actually start.
3. *Work quickly to conserve "freshness."* It is a battle against time. Every hour will mean greater activity of our enemies, the spoilage agents.
4. *Choose your method.* Follow the directions given for your particular product.
5. *Watch your time tables.* A watch or a timer will come in handy. It may help avoid underprocessing or undercooking.
6. *Make sure cans and jars are truly hermetically sealed.*
7. *Store in cool dry place.*

Helpful hints to the teacher:

The first lesson in canning may be used to induct the students slowly but surely into the process of canning. Remind them that it is not just "practice makes perfect," but it is "*correat* practice makes perfect."

Useful in this regard are such visual aids as extension bulletins on canning, movies on "Principles of Home Canning," "Canning of Meat" and "Canning of Poultry"; and posters on steps in the canning procedure.

It is very helpful also to have the students do work set-ups of the various steps in canning, especially exhausting, sealing, and processing.

The facts that might be emphasized then are embodied in the 7 pointers for success in food processing: the type of equipment, the raw materials, the steps in the procedure, and the evaluation of the product.

THE EQUIPMENTS: The various parts of the tin can and glass jars can be described. Samples of different sizes and shapes of glass jars and tin cans can be exhibited in the laboratory. Then, the construction and uses of water bath processor and the pressure canner is a must for every home canner.

THE SUPPLIES: Only the best.

THE METHOD: The processing periods given in the procedures are for the usual circumstances. Processing time depends on the acidity of the product, its degree of ripening or maturity, size of the containers, consistency of the material and temperature of the sterilizer.

EVALUATION OF THE PRODUCT: Evaluation, especially of canned fruits, ought to be done at least 3 weeks after the processing to allow for interchange of substances between the canning medium and the fruit.

How are foods canned?

GENERAL DIRECTIONS FOR CANNING

Assemble these equipments for home canning:

A water bath processor —see directions on pages 120-121
A steam pressure cooker — see directions for use on pages 121-123
Glass jars
Tin cans (See Table 17 for common food can sizes.)
Sealer
Measuring cups and spoons
Long handled spoons
Stainless steel knives
Colander
Trays
Bowls or basins
Board
Jar lifter
Jelly bag
Blanching basket
Bottle brush
Plenty of towels
Thermometer
Timer
Kitchen scales
Vegetable brushes or *gogo* or *isis* leaves for cleaning and washing fruits and vegetables

Assemble your supplies.

Steps in preparation:

The two methods commonly used for preservation of foods in hermetically sealed containers are the open kettle method and the hot or cold pack method.

In the cold pack method: as the name implies the food is packed cold, then only covered with hot liquid.

In the hot pack method: the food is pre-cooked and then packed while hot into sterilized glass jars or clean tin cans. This method is recommended for vegetables and meat.

In the open-pack method: the sterilized food is placed in sterilized jars and sealed completely without any further processing. This method is applicable only to fruits, tomatoes, and pickles.

The most common methods of processing are the use of a water bath processor and a steam pressure canner. Foods with pH above 4.5, the less acid foods, are processed in a steam pressure canner. Under this classification fall meats of all kinds and all vegetables, except tomatoes and ripe pimiento peppers. For fruits and acid vegetables, a water bath processor where the highest temperature attainable is 212°F will suffice. Table 14 gives the pH of common fruits. This will give you an idea as to whether a water bath processor or a steam pressure canner ought to be used.

TABLE 17. COMMON FOOD CAN SIZES

Can Name	*Dimensions* Diameter x Height	*Capacity, fluid ounce*
Buffet	211 x 304	9
No. 2	307 x 409	18
No. 2 1/2	401 x 411	26
No. 3 Cylinder	404 x 700	30
No. 5	502 x 510	52
No. 10	603 x 700	96

OPEN WATER BATH PROCESSING

For fruits, tomatoes and acid vegetables, *use a water bath canner.* Any large stock pot, lard can, or boiler may be used for this purpose. It should be deep enough to permit water to reach 1 or 2 inches over the tops of the jars and to allow a little extra space for boiling. It must have a close fitting lid and should be fitted with a wooden or metal rack. The rack may be bamboo slats, wood, heavy wire or other perforated materials but must be put together in a manner that will allow water to circulate. It must hold the jars at least 1/2 to 1 inch above the bottom of the vessel.

GENERAL DIRECTIONS FOR USING WATER-BATH CANNER

1. Prepare only enough jars of food at one time to fill the processor. Work rapidly so that as little time as possible will elapse between pre-cooking or packing the food and getting it into the vessel.
2. Fill canner about two-thirds with water.
3. Heat water in canner. Have the water boiling if the food to be processed was packed hot into jars. If the food was packed cold into jars have the water hot, but not boiling. This will prevent breakage.
4. Put filled jars in canner. Place them in an upright position so that the bottom of each jar rests on the canner rack. Do not crowd jars so as to allow the free circulation of water under and around them. Use tongs or waterproof, rubberized canvas gloves to put jars in canner and to take them out.
5. If your water bath canner is deep enough, two layers of jars may be put in at one time. Use a divider rack between the layers of jars to permit good circulation of water. The rack may be made of wooden slats or of sheet metal punch with 1/2 inch holes.

6. When all jars have been placed in canner, add boiling water, if necessay, to bring water over top of jars by 1 or 2 inches. Do not pour boiling water directly on glass jars, as this may break them.
7. Count time as soon as the water begins to BOIL VIGOROUSLY (ROLLING BOIL). Write the time down on a canning record. Other data to be included in canning record are product, data, batch number, size and number of jars, time cooking starts, time out, and total time of cooking.
8. As soon as processing time is up, take the jars from canner, one at a time. Place them on a dry wooden surface or heavy wire rack. Complete seals at once if lids are not the self-sealing types. If liquid has boiled out in canning, seal the jar just as it is. DO NOT OPEN IT TO PUT IN MORE LIQUID. (Why?)

Cooling of Jars

Allow jars to cool top side up. Give each jar room so air can get in to all sides. Avoid draft or cold or wet surfaces for glass jars because sudden cooling may break a jar. Do not cover jars while they are boiling. Jars should be cooled overnight before storing them.

Testing for Proper Seals

As soon as jars are cooled, test them to see if they are sealed. Turn each jar partly over in your hands to see if it leaks.

To test jars with flat metal lids tap center of lid with a spoon. *A clear ringing sound means a good seal.* A dull note, however, does not always mean a poor seal. If there is no leakage, store jar and watch for signs of spoilage.

Use food in leaky jars right away or can it again. Empty the jar, heat food, pack and process as if it were fresh. Check jar or lid for defects before using it again. Self-sealing metal lids or rubber rings are not re-used.

Labeling of Jars

Label jars to show contents, date of canning, and batch number. Should spoilage occur in one jar, watch for signs of spoilage in other jars canned at the same time. If jars are stored in cardboard boxes, label the box also to show name of product and date canned.

GENERAL DIRECTIONS FOR USING PRESSURE CANNERS

1. Assemble materials and equipment. Pressure canner should be thoroughly clean and working properly.
2. Check jars, rings, and closures. Wash and rinse thoroughly.
3. Have plenty of boiling water available.
4. Sort food for size and degree of ripeness.
5. Pour hot water into washed jars until needed.
6. Follow specific directions in books for best results.
7. Preheat or precook food as per recipe.

8. Place 2 quarts of boiling water in cooker with basket in place. Set cooker on heat.
9. Place clean, sterile rubber rings on jar or cover as directed, when closure requires separate rings. Return jars to hot water until ready to fill.
10. Fill hot containers promptly with hot food according to given directions.
11. Fill jar to proper level with boiling liquid when recipe requires. Don't fill the container up to the top but allow space for any expansion. Equipments used should be clean.
12. Work out bubbles with clean knife or spatula. Wipe sealing edge with clean wet cloth.
13. Adjust closures on jars according to directions for types of closures used. If bottles, close tightly then turn 1/4 inch.
14. Place each hot container into pressure canner.
15. Place cover on cooker and lock in closed position. Use maximum heat under it. Do not have these containers in direct contact with pressure canner's bottom or sides.
16. Watch for steam to come from petcock. Petcock valve should be widely opened. Under no conditions should pressure be brought up in the cooker until it is in exact position.
17. Allow steam to come out freely for 7-10 minutes to eliminate all air pockets. (Why?) Close petcock.
18. Use maximum heat to raise pressure to required point—then lower heat. Start counting processing time the moment required pressure is reached. Pressure cooker should be kept at required point by raising or lowering heat as needed, to eliminate fluctuations in in pressure.
19. Turn off heat at end of processing time, or move cooker from heat at end of processing time when using electric stove or any constant heat unit.
20. When canning in glass jars, allow pressure to return to zero of its own accord. When indicator reaches zero, gradually open position. Let cooker cool for 2 or 3 minutes. (Explain.)
21. Open. Remove cover from cooker. Under no circumstances should the cover be turned until dial on the steam gauge points to 0. Lift cover so steam is away from you.
22. Immediately toss dish towel over cooker and containers. Let cooker stand for 3 or 4 minutes.
23. Remove basket of jars from cooker and place on board or towel, free from draft. Do not place containers directly in contact with table or surface.
24. Tighten closures while hot except when using two-piece metal caps. Never tighten two-piece metal caps after processing.

25. Set jars apart on board or cloth for cooling, away from draft to remain for 24 hours.
26. 24 hours later, test seals according to directions, wipe jars clean, label and date, then store in cool, dry place.

Follow the directions that come with pressure canner. Bear in mind the alterations. With regard to altitude processing, increase the pressure by 1 pound for every 2000 feet above sea level.

TABLE 18. DO'S AND DON'T'S ON CANNING

1. Do have an ample supply of jar tops, rubbers, or self-sealing lids. Get them out in advance and make sure they fit jars.
2. Do inspect jars carefully for possible defects; wash, rinse, and boil or prepare in oven.
3. Do select only good quality, fresh, clean fruits and vegetables. Wash well. Blanch vegetables. Do preheat fruits and tomatoes.
4. Do make sirup in advance when canning fruits, and keep it hot until ready to use.
5. Do remove one hot jar at a time from water or oven so it will stay hot when packing jars.
6. Do pack hot jars as quickly as possible and seal immediately.
7. Don't pack food too solidly in jars or heat will not penetrate evenly. Leave recommended headspace.
8. Do have a clean, moist dishcloth handy so that food particles may be wiped off from rim of jar, or from rubber ring.
9. Do place all jars in canner or water bath as quickly as possible in order that they begin heating at same time.
10. Do check timetable carefully for correct processing time and temperature.
11. Do count processing time from moment required pressure is reached or water bath reaches rolling boil. Otherwise, processing may be inaccurate.
12. Do protect jars from drafts after processing. Never invert nor cover them while cooling. Leave air space between jars.
13. Do wipe jars clean after they have cooled. Label with name and date, if desired.
14. Do store jars in a cool, dry, dark place. Light causes food to fade and destroys vitamins.
15. Do examine jars after a week or 10 days for signs of spoilage. Remove and dispose of spoiled food at once.
16. Don't can more than you are reasonably sure of using before the next canning season.
17. Do make sure that upon opening covered food, odor is characteristic of product with no outrush of air or liquid.
18. Don't taste to test for spoilage.

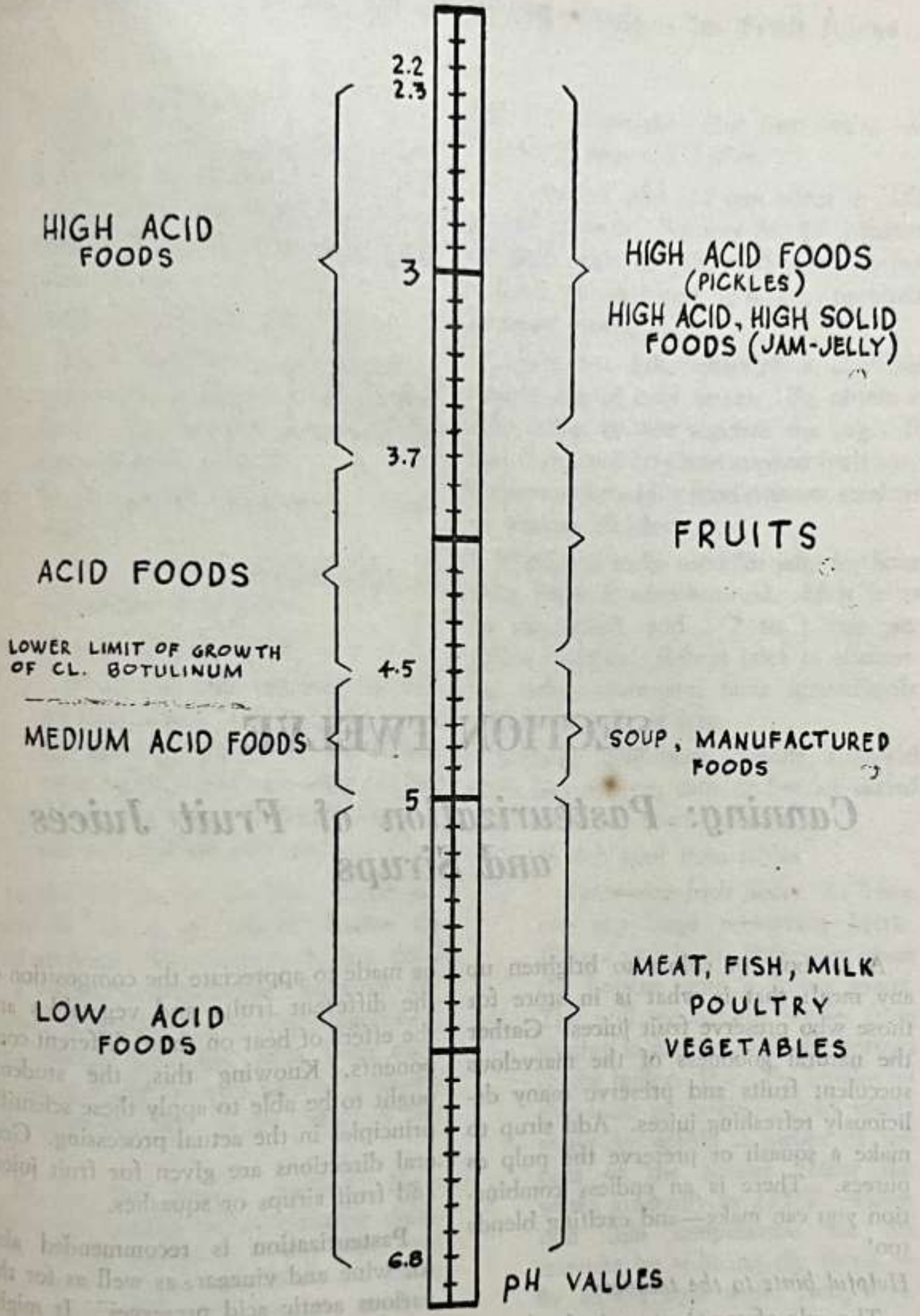
Even a bite of spoiled non-acid food may cause illness or death.

19. Do cook all canned, non-acid vegetables at boiling temperature for at least 10 minutes before tasting.

20. Don't reclaim spoiled food. Never feed questionable food to animals. It's dangerous to them, too.

REFERENCES

1. Anonymous, *Food Preservation in Glass Jars.* Bureau of Agricultural Extension.
2. Anonymous, *Home Canning Guide* (Ohio: Westinghouse Home Economics Institute, Mansfield).
3. Anonymous, *Modern Guide to Home Canning.* (Wisconsin: National Pressure Cooker Company).
4. Anonymous, *The Canned Food Reference Manual* (New York: American Can Co., 1939).
5. Desrosier, N. W., *The Technology of Food Preservation* (Connecticut: Avi Publishing Company, Inc., 1959).
6. Frazier, W. C., *Food Microbiology* (New York: McGraw Hill Book Company, Inc., 1958).


2.2
2.3
HIGH ACID FOODS
3
HIGH ACID FOODS (PICKLES)
HIGH ACID, HIGH SOLID FOODS (JAM-JELLY)
3.7
FRUITS
ACID FOODS
LOWER LIMIT OF GROWTH OF CL. BOTULINUM
4.5
MEDIUM ACID FOODS
SOUP, MANUFACTURED FOODS
5
LOW ACID FOODS
MEAT, FISH, MILK
POULTRY
VEGETABLES
6.8
pH VALUES

pH VALUES OF IMPORTANT FOOD GROUPS

SECTION TWELVE

Canning: Pasteurization of Fruit Juices and Sirups

A rainbow of colors to brighten up any meal: that is what is in store for those who preserve fruit juices. Gather the natural goodness of the marvelous succulent fruits and preserve many deliciously refreshing juices. Add sirup to make a squash or preserve the pulp as purees. There is an endless combination you can make—and exciting blends too!

Helpful hints to the teacher:

The role of temperature in food preservation can again be brought to focus during the discussion period preceding the actual processing. The students can be made to appreciate the composition of the different fruits and vegetables and the effect of heat on these different components. Knowing this, the students ought to be able to apply these scientific principles in the actual processing. General directions are given for fruit juices and fruit sirups or squashes.

Pasteurization is recommended also for wine and vinegar, as well as for the various acetic acid preserves. It might be interesting at this point to add the human element in the form of the story of the man who introduced this method of preservation.

LABORATORY PROBLEM 36 General Directions for Fruit Juices

1. Select your products.

   Choose only sound, ripe fruits with an agreeable flavor and aroma. Sort the fruits carefully. Insipid fruits will not make good juice.

2. Check your equipment.

   Have food jars and processing equipment ready and thoroughly clean. See general directions for canning in Section 11.

3. Work quickly to conserve "freshness."

   This prevents deterioration of palatability and color.

4. Choose your method.

   Wash the fruit carefully in cold running water and cut out stems and blossom ends. Drain and then treat by either of two methods for extracting juice — the cold process and the hot process.

In the cold process method. Crush the fruits by means of potato masher or food chopper. Press the fruit in a cloth or a fruit press to extract most of the juice. At home, empty the fruit into a long flannel sack and twist both ends of the sack tighter and tighter, pressing juice from the fruit in the center of the sack.

In the hot process method. Heat fruits and berries before pressing them. For berries and juicy fruits, place half the fruit in a preserving kettle and mash them thoroughly with a potato masher. Add the rest of the fruit in a container over a large pan containing hot water and heat slowly. Never allow the temperature of the fruit juice to go beyond 190°F. *Remember that fruit juices are injured if they are boiled.*

In general, add 1/2 cup water to each pound of fruit. Simmer for 15 minutes or until fruit is quite soft and floating in juice. Longer heating may be required for hard fruits.

Strain the juice through a clothbag wrung out of cold water. To obtain a clear juice, do not squeeze the bag. If juice need not be clear, cooked fruit may be passed through a food press or strainer or waring blendor.

If juice is to be used for jelly for later date, leave it unsweetened. If it is to be sweetened, add 1/2 to 1 cup per gallon of juice. Reheat juice to simmering temperature and pour immediately into hot sterilized jars.

Suitable containers include standard glass jars and tin cans or bottles sealed with corks or crown-type caps.

5. Watch your time tables

   Pasteurize fruit juices. At home use any large preserving kettle. Place a rack in the bottom or cover the bottom with a heavy towel. This will prevent the bottles from coming in contact with the bottom of the boiler. Place the bottles on the rack or towel. Add warm water to within 2 inches of the tops of the bottles. Heat the water gradually to 175°F. Maintain this temperature for 30 minutes by reducing the flame or by adding cold water from time to time.

6. Cork, cap, or seal the containers.
7. Label and store in a cool, dark space.

ALOHA FRUIT PUNCH

Assemble these utensils:

- 2 saucepans
- kitchen knife
- measuring cups
- fruit squeezer
- chopping board
- 2 utility plates
- thermometer
- mixing bowl
- 6 buffet cans

Assemble these supplies.

- 2 cups orange juice
- 1 cup crushed pineapple
- 4 cups guava juice
- 1 1/2 cups sugar
- 1/2 cup *kalamansi* juice

Steps in preparation:

1. Wash and trim fruits thoroughly.
2. Simmer guava (add 1/2 cup water to each pound of fruit) for 15 minutes. Squeeze the cooked fruit in a clothbag or pass through a fruit press or strainer.
3. Squeeze the orange and *kalamansi.*
4. Combine guava, orange, *kalamansi,* crushed pineapple and sugar together.
5. Heat to simmering temperature.
6. Pour hot into sterilized bottles. Fill within 1/8" from the top.
7. Process in water bath at simmering temperature, 180° F for 20 minutes.
8. Cool and store.

Yield: 6 buffet cans.

DUHAT JUICE

Assemble these utensils:

- kitchen scale
- large kettle
- fine *sinamay* cloth
- 8-ounce bottles

Assemble these supplies:

- 1 1/2 kilo *duhat*
- sugar
- water
- citric acid

Steps in preparation:

1. Wash and sort the fruits.
2. Weigh the fruits and add half of its weight of water.
3. Simmer the fruit and water for 15 minutes.
4. Extract juice with a clothbag.
5. Repeat steps 2, 3, and 4 to extract juice for a second time.
6. Combine first and second extractions.
7. Clarify the juice by passing through fine *sinamay* cloth folded 4 times.
8. Weigh the juice.
9. Add sugar and citric acid to suit taste.
10. Simmer juice and fill the bottles hot.
11. Seal and pasteurize for 30 minutes. (180°)
12. Cool, label, and store.

GUAVA JUICE

Assemble these utensils:

- kitchen scale
- measuring cup
- measuring spoon
- 2-quart mixing bowl
- 2-quart saucepan
- strainer or clothbag
- kettle
- thermometer
- cutting board
- timer
- 2 buffet cans

Assemble these supplies:

- 1/2 kilo fully ripe guavas
- 2 tablespoons sugar
- 1/2 cup water

Steps in preparation:

1. Wash fruits thoroughly.
2. Cut out stems and blossom ends.
3. Drain then crush fruits.
4. Add 1/2 cup water to each kilo of fruit.
5. Simmer for 15 minutes or until fruit is quite soft and floating in the juice.
6. Strain through a clothbag. Do not squeeze the bag or otherwise hasten dripping if a clear juice is desired. An alternative method is to pass the cooked fruit through a fruit press or strainer if juice need not be clear.
7. If juice is to be sweetened, add 1/2 to 1 cup sugar per gallon of juice.
8. Reheat the juice to simmering and pour immediately to tin cans or hot sterilized jars. (If the latter is used, fill to within 1/8" from the top.)
9. Seal and process in water bath with water at simmering temperature (180°F) for 15-20 minutes. (20 minutes for both pint and quart jars.) After processing completely seal glass jar.
10. Cool, label, and store.

Yield: 2 buffet cans.

GUAYABANO JUICE

Assemble these utensils:

- kitchen scale
- 4-quart saucepan
- measuring cups
- measuring spoons
- thermometer
- cutting board
- 4-quart mixing bowl
- 5 buffet cans

Assemble these supplies:

- 1 kilo ripe guayabano
- 4 cups water
- 3/4 cups sugar
- 1/2 teaspoon citric acid.

Steps in preparation:

1. Wash fruits thoroughly.
2. Peel, remove inner core.
3. Cut into 2 inch square pieces.
4. Heat with 2 cups water to 140-145°F for 3 minutes.
5. Press out juice through jelly bag while hot.

6. Extract juice a second time with 2 cups water.
7. Add sugar and citric acid to juice.
8. Fill buffet cans.
9. Exhaust to 180°F.
10. Seal immediately and process at 180°F for 10 minutes.
11. Cool, label, and store.

Yield: 5 buffet cans

MANGO JUICE

Assemble these utensils:
saucepan
kitchen knife
measuring cups
measuring spoons
waring blendor
chopping board
2 utility plates
thermometer
mixing bowl
rubber scraper
5 buffet cans

Assemble these supplies:
1 kilo medium-sized mangoes of carabao variety
3/4 cup sugar
2 1/2 cups water
1 teaspoon citric acid (5 grams) or *kalamansi* juice

Steps in preparation:

1. Wash fruits thoroughly.
2. Slice off both cheeks from the seeds.
3. Scoop out the flesh from the cheeks and seeds.
4. Pass through a waring blendor or a fruit pureer.
5. Add an equal volume of sirup with added citric acid (made by dissolving 3/4 cup sugar in 2 1/2 cups of water plus 1 teaspoon citric acid.)
6. Heat the mixture to 180°F.
7. Fill cans.
8. Seal.
9. Process at 180°F for 15 minutes.
10. Cool cans immediately after processing.

ORANGE PAPAYA JUICE

Assemble these utensils:
kitchen scale
2 4-quart utility bowls
peeler
fruit juice squeezer
fruit pureer or waring blendor
4-quart saucepan
big kettle or saucepan with rack
thermometer

Assemble these supplies:
2 kilos firm, fresh *singkum* oranges
2 medium-sized firm-ripe papayas
syrup (1 cup sugar per 4 cups water)

Steps in preparation:

1. Scrub fruits and wash thoroughly.
2. Extract orange juice gently by means of a fruit juice squeezer.
3. Peel and cube the papayas.
4. Pass through a fruit pureer or waring blendor.
5. Add an equal volume of thin syrup (1/4 cup sugar per cup water) to the papaya juice.

6. Mix papaya with an equal volume of orange juice.
7. Heat juice to 180°F.
8. Fill No. 2 can leaving 1/8" headspace.
9. Process at 180°F for 10 minutes.
10. Cool cans immediately after processing.

PAPAYA ADE

Assemble these utensils:

4-quart saucepan
2-quart saucepan
strainer
kitchen knife
waring blendor
cutting board
4 buffet cans

Assemble these supplies:

2 cups papaya puree from sound ripe fruits
1 cup water
1/2 cup *kalamansi* juice
1 1/2 cups sugar

Steps in preparation:

1. Mix the puree in a waring blendor for 1 minute or make the papaya very fine by passing through a jelly bag.
2. Mix thoroughly with the rest of the ingredients.
3. Heat juice to 180°F.
4. Fill tin can and seal.
5. Process at 180°F for 10 minutes.
6. Cool, label and store.

Yield: 4 buffet cans

SANTOL JUICE

Assemble these utensils:

measuring cups
2 2-quart mixing bowls
strainer
kettle
thermometer
6 buffet cans

Assemble these supplies:

3 cups santol seeds
6 cups water
3 cups sugar

Steps in preparation:

1. For every measure by volume of santol seeds, add an equal volume of water.
2. Simmer for twenty minutes. Strain.
3. Prepare second extraction using identical proportion of water.
4. Simmer for twenty minutes. Strain.
5. Combine 2 extractions. Add sugar.
6. Fill tin cans while hot and seal.
7. Pasteurize at 180°F for 10 minutes.

Yield: 6 buffet cans

TOMATO JUICE

Assemble these utensils:

kitchen knife
chopping board
wooden spoon
2-quart saucepan
2-quart utility bowl
utility plate
stainless steel
strainer
liquid measuring cup

big kettle or saucepan with rack
6 buffet cans
thermometer
timer

Assemble these supplies:

1 kilo ripe tomatoes
3/4 teaspoon salt

Steps in preparation:

1. Choose ripe, juicy tomatoes.
2. Wash, remove stem ends, cut into pieces.
3. Simmer until softened, stirring often.
4. Pass through strainer.
5. Add 1 teaspoon salt to each quart juice.
6. Reheat at once just to boiling.
7. Pack
   a. In glass jars — Fill jars with boiling-hot juice to 1/4 inch of top. Adjust jar lids. Process in boiling-water bath (212°F) — pint and quarts jars for 10 minutes.
   b. In tin cans — Fill cans to top with boiling-hot juice. Seal cans at once. Process in boiling-water bath (212°F)—buffet cans for 10 minutes, No. 2 cans for 15 minutes, No. 2 1/2 cans for 15 minutes.
8. Cool promptly and store in a cool dry place.

Yield: 6 buffet cans.

Helpful hints:

* Serve as a *first course* of any meal.

* Use as an *appetizer; tomato juice cocktail*. This consists of such ingredients as lemon juice, sugar, onion juice and a stalk of celery, a bit of bayleaf for flavoring. The mixture is chilled and strained.

* Combine with clam juice and call *clam juice cocktail*.

LABORATORY PROBLEM 37 Fruit Sirups or Squashes

GENERAL DIRECTIONS FOR FRUIT SIRUPS OR SQUASHES

1. Select fruits. Those suitable for use in fruit sirups are the fully ripe but firm ones, and the fruits too ripe for bottling or jam making. Unripe fruits are too acid, flavor is not developed and the flow of juice is insufficient.
2. Clean the fruits. Place the fruits in a container and wash gently in cold water.
3. Prepare the juice by the hot or cold process.
   A. Hot Process
      (1) Double Boiler set-up. Place the fruit in a large earthenware basin and break up with a wooden spoon or pulper. Place the basin over a vessel of water on stove. It should be heated until the juice

begins to flow (about 1 hour for 2.5 kilograms) boiling water if necessary. This set-up is equivalent to a double boiler, therefore there is no overcooking. When there is plenty of juice flowing from the fruit, it is again crushed with a wooden spoon or pulper.

(2) Boiling — heat the fruit in a saucepan with only as much water as necessary and bring it quickly to a boil with constant stirring. Boil the fruit for 1 minute. Crush any whole fruit with a wooden spoon or pulper.

(3) Extractor — Follow the instructions usually given with the particular model of juice extractor.

4. Press out the juice

a. Fruit press — The best yield of juice will be obtained if a fruit press is available.

b. Jelly bag — Tip the fruit in a scalded jelly bag and allow it to drain overnight and on the following day, press the pulp thoroughly to remove the remaining juice. This is the more usual method.

c. Cloth — Enclose the fruits in the cloth and twist the ends in opposite directions.

d. Sieve — Strain in fruit through the sieve, but in this way more fruit tissue will remain in the sirup.

5. Add the sugar

The quantity of sugar may be varied, but generally 3/4 pound sugar is recommended for each 1 pint juice.

6. Bottle and Process the sirup. Bottle the sirup at once. Process at 170°F for 30 minutes or at simmering point for 20 minutes.

B. Cold Process — retains fresh flavor better

(1) Extract the juice — the addition of water is not generally recommended when either of these methods of extraction is used.

a. fermenting method — Place the fruit in a cask or earthenware jar and crush it well with a thin cloth. Allow the fruit to ferment a little. When the bubbles of gas are forming on the surface of the fruit, fermentation has proceeded far enough. Most fruits need only be left for about 1 day in a warm room, but some fruits may need 3-5 days. Press out the juice by one of the methods suggested.

The fermentation helps the juice flow more freely from the fruits without heating it. It also causes some breakdown of the pectin in the fruit and helps to prevent the sirup forming a jelly in the bottle. If fermentation is allowed to proceed too far, the flavor of the sirup will be affected.

b. pectin method—Place the fruit in a cask or earthenware jar and crush it well. Mix in pectin decomposing enzyme at the rate of 1/4 ounce to every 10 pounds fruit. Leave most fruits overnight then press out the juice by one of methods given under hot extraction.

The addition of the enzyme helps to destroy the pectin in the fruit more quickly than when fermentation alone is used, but the enzyme may be difficult to obtain.

(2) Add the sugar. One pound sugar is used per pint juice when chemicals are being used to preserve sirup. The sirup should be stirred well until the sugar is dissolved.

(3) Add the acid.

Strawberry juice needs acidifying if it is to be preserved with a chemical preservation and 1/2 ounce citric acid should be added to each gallon of strawberry juice. Other fruits are sufficiently acid.

(4) Clarify the sirup

To obtain a clear product the sirup can be strained through a jelly bag or through several layers of muslin.

(5) Preserve the sirup with chemical preservatives.

Sulfur dioxide may be added in the form of one fruit preserving tablet dissolved in a tablespoon of warm water added to a pint of sirup. As this preservative will cause some fading of color, artificial coloring is sometimes added. There is no need to boil the sirup to remove the preservative before use as the amount present in the diluted drink is so small. Sodium benzoate is an alternative preservative, 1/4 oz. should be dissolved in a little water and added to 2 gallon sirup (1/4 oz. per 2 gallon or 7 g. per 32c of juice).

(6) Bottle the sirup

Bottles must be well cleaned preferably by putting them in water which is heated up to boiling taking out the bottles and inverting to drain an hour or two just before use.

Corks or stoppers must also be clean and boiled for 1/4 hour just before use. Sirups preserved in this way keep in good condition for 2 or 3 weeks after the bottle has been opened provided they are kept in a cool place.

(7) Processing

If preferred these sirups may be heated for the hot process instead of adding chemical preservatives.

Sediments

When the sirup has been bottled for some time, a sediment usually appears at the bottom. This is due to suspended particles of pulp which are too fine to be retained by a jelly bag or muslin. Unfortunately there is at present no satisfactory home method of filtration. However, if the sirup is poured carefully without disturbing the sediment a clear sparkling product can be obtained.

CITRUS FRUIT SIRUPS AND SQUASHES

The best results are usually obtained when the juice is combined with a little of the oil from the rind, but the pith should not be used at all as this gives a bitter flavor.

1. Extracting juice

   Citrus fruits should always be washed well in clean water before cutting. The juice may be extracted with a lemon squeezer or if preferred the flesh can be separated from the pith. The oil can be obtained by grating the rind with a fine grater or even lump sugar or thin slices of rind can be used. If the peel is not wanted in the final product, it can be mixed with sugar and water and strained off when the sugar has dissolved. When making a sirup the juice is also strained to remove the fruit tissues but these are left in a fruit squash.

2. Adding the sugar and acid

   The quantity of sugar added will make a squash stand dilution to about 5 times its quantity of water. Most citrus fruits are improved by adding a little citric acid but this is not essential with lemon. The sugar sirup and acid should be added to the exhausted juice.

3. Bottling and processing the sirup

   The fruit sirup or squash should be poured into clean bottles and processed by heat or preserved with clean preservative in the same way as other fruit sirups.

Helpful hints in making sirup:

1. The fruit should be fully ripe but free from molds.
2. Neither the fruit nor the juice should be allowed to come in contact with iron, copper or zinc dur-

ing any stage of the operation otherwise flavor deterioration and discoloration may occur.

3. Care should be taken that all the sugar is dissolved before the sirup boils.
4. Only clean bottles should be used.
5. The corks should always be well boiled before use, otherwise the sirup may get moldy on storage.
6. When processing bottles, 1 1/2" headspace should be left to allow for expansion during heating.
7. During processing, the corks should be wired or tied down, otherwise they will pop out. Screw-up bottles or bottles with a screw cap over a cork are convenient.
8. When chemical preservatives are used, the quantity of preservative recommended should not be exceeded.
9. When pouring out the sirup, care should be taken not to disturb the sediment or the sirup will appear cloudy.

Evaluate the product:

Appearance: *clear, sparkling, cloudy,* hazy, dark

Texture: *smooth,* thin, thick, very dilute, medium thick

Palatability: *refreshing, characteristic fruit flavor,* extremely sweet, sour, flat

ORANGE SIRUP OR SQUASH

Assemble these utensils:

orange squeezer
liquid measuring cup
set of measuring cups
measuring spoons

Assemble these supplies:

2 cups orange juice (from 8 oranges)
5 cups sugar
5 cups water
2 tablespoons citric acid

Steps in preparation:

1. Wash the oranges.
2. Squeeze out the juice.
3. Peel very thinly and grate the rind of half of the oranges.
4. Add the rind to the sugar and water.
5. Warm and stir until the sugar has dissolved and then strain.
6. Pasteurize as in general direction.

LEMON SIRUP OR SQUASH

Assemble these utensils:

juice squeezer
liquid measuring cup
set of measuring cups
mixing spoons

Assemble these supplies:

2 cups lemon juice
6 cups sugar
5 cups water
1 1/2 teaspoon citric acid

Steps in preparation:

Do as in orange sirup or squash.

REFERENCES

1. Anonymous, "Domestic Preservation of Fruits and Vegetables." Ministry of Agriculture, *Fisheries and Food Bull. No.* 21. (London: Her Majesty's Stationery Office, 1962).
2. Cariño, L., *"Guayabano Juice."* U.P. College of Home Economics special problem. Unpublished, 1963).
3. Gaddi, A., "Duhat Juice." U.P. College of Home Economics special problem. (Unpublished, 1963).
4. Guzman, M.P., *Laboratory Procedures for Food Preservation.* U.P. College of Home Economics. Unpublished.
5. Perez, P.T., *Orange Papaya Juice.* U.P. College of Home Economics. Unpublished.

SECTION THIRTEEN

Canning of Fruits and Vegetables

Fruits and vegetables are valuables offering vitamins and minerals galore and resplendent in nature's seven colors; but unfortunately they are perishable foods. Can them at the height of their season and enjoy them throughout the year.

Helpful hints to the teacher:

The second lesson on canning should echo the tenets set down in the preceding lesson. The 7 points for success in processing are now applied to fruits and vegetables.

It is important to check on the interpretation and application of the principles in each step in the procedure. Is the student observing the correct choice of materials? Is he using the proper tools? Is he working quickly enough? Is he following the method to the letter — rolling boil when rolling boil is called for? Is he watching his time table twenty minutes, not more, not less, 240°F, not more, not less? Is he evaluating the canned product? Are the labels intelligently made?

The standards of the teacher should be high. "Good, better, best; never let it rest, till the good is better and the better, best."

Figure 6. pH VALUES OF COMMON PHILIPPINE FRUITS

HIGH ACID FRUITS

2.0 — Lime Juice
2.2 — Tamarind Pulp, Ripe
2.3 — Tamarind Pulp, Unripe
3.0 — Mango (Green), Passion Fruit Juice, Lanzon (Ripe)
3.3 — Santol (Unripe), Spanish plum (Unripe)
3.4 — Santol (Ripe)
3.4 — Mango (Kalabaw Variety — Rare-Ripe)
3.5 — Mango (Piko Variety — Rare-Ripe);
3.6 — Spanish Plum (Ripe); Black Plum (Ripe); Pineapple Pulp (Ripe)

3.7 — Native Orange (Szinkum) Juice; Pineapple Pulp (Unripe), Lanzon (Unripe) Pomelo (Ripe)
3.8 — Pomelo (Unripe)
3.9 — Soursop (Ripe); Pomegranate (Ripe); Guavas (Ripe)
4.1 — Black Plum (Unripe)
4.2 — Anonas Pulp (Ripe); Tomato (Ripe)
4.4 — Tomato (Unripe); Banana (Saba), Pomegranate (Unripe)

MEDIUM ACID FRUITS:

4.5 — Aztec Kwamochile (Ripe), Jackfruit (Ripe)
4.8 — Aztec Kwamochile (Unripe); Soursop (Unripe); Banana (lacatan)
4.9 — Watermelon (Ripe); Mango (Piko) Ripe
5.0 — Papaya; Sugar Apple (Ripe), Watermelon (Unripe)
5.1 — Jackfruit (Unripe)
5.2 — Violet Star apple (Unripe), Chico (Ripe)
5.4 — Green Star apple (Unripe), Violet Star apple (Ripe), Chico (Unripe); Papaya, ripe
5.5 — Canistel Tiese (Ripe)
5.7 — Canistel Tiese (Unripe), Papaya (Unripe)
5.8 — Avocado (Ripe), Green Star apple (Ripe); Chico Mamei (Unripe)
6.0 — Cantaloripe Pulp (Ripe), Avocado (Unripe)

LOW ACID FRUITS:

6.2 — Squash (Ripe)
6.5 — Squash (Unripe), Sugar Apple (Unripe); Bread Fruit (Ripe)
6.6 — Chico Mamei (Ripe)
6.8 — Bread Fruit (Unripe)

LABORATORY PROBLEM 38 Water-Bath Processing of High-Acid Fruits

GENERAL DIRECTIONS FOR CANNING FRUITS, TOMATOES AND PICKLED VEGETABLES

1. *Select your products.*

   Choose only fresh, firm fruits. Unripe fruits will give an acid, starchy product, lacking in aroma, taste and color. Overripe fruits will crush easily and result in an unattractive pack.

   Sort the fruits according to size and degree of maturity. A mixed batch will not cook evenly.

2. *Check your equipment.*

   Assemble all the equipment called for in the procedure. See Section 11 for general directions for canning.

3. *Work quickly, conserve "freshness."*
4. *Choose your method.*

   Follow the directions for the specific fruits. In general, it is necessary to wash the fruit thoroughly. To avoid bruises, wash them in small batches at a time under cold running water. If allowed to stand long after washing, they become too soft.

   Prepare the fruit. Peel, pit, or core as needed.

   Bear in mind that fruits that are skinned or cut into pieces discolor easily. To remedy this, soak fruits in a weak brine solution (one tablespoon salt to every 4 cups water) or in light sirup.

Medium for Canning Fruits

Fruits may be preserved in sirup, water or fruit juice, in sugar only, or without anything added depending upon their character and their use.

To can in sirup. Boil sugar and water for 5 minutes. Remove the scum if extracted fruit juice is used in place of water. The table shows different types of sirups that may be used.

TABLE 19. SIRUPS FOR CANNING FRUITS

Kind	Sugar	Water or Fruit Juice	Approximate Yield	Use
Thin	1	3	3 1/2 cups	Medium sweet fruits
Medium	1	2	2 3/8 cups	Slightly sour fruits
Thick	1	1	1 1/2 cups	Sour fruits

Apportion 3/4 to 1 cup sirup per quart jar or No. 2 1/2 can of canned fruit.

To can with water or fruit juice. **Prepared raw fruits are packed in hot sterilized jars and filled to within 1/2 inch of the top with boiling** fruit juice or water. Another method is to preheat the fruit for about 3 minutes in a little water or its own juice and pack hot.

The advantage of canning in water or sirup is that they can be used for cooking purposes and for desserts; but the fruits retain their shape and color better in sirup.

To can with sugar only. Add 1/2 to 1 cup sugar for each quart of juicy fruits or berries. Allow fruit and sugar to stand 2 or 3 hours to start the juice flowing or heat very slowly, preventing the fruit and sugar from burning. Bring the fruit to a boil and boil for 5 minutes. Pack fruit and juice in hot sterilized jars.

To can without adding anything. Blanch the fruit in boiling water, dip in cold water, drain well and pack lightly into containers. The natural juice of some juicy fruits will serve as liquid.

Pack fruits either hot pack or cold pack. As a rule, precooking fruits in light sirup and packing hot in sterilized jars or tins improves the preserved product, but some fruits may be packed cold and sterilized.

In the *hot pack method,* the fruit is heated in sirup water or steam before packing. Juicy fruits and tomatoes may be preheated without adding liquid and packed in the juice that cooks out. It is wise to remember that fruits should be close to boiling point when it is put into either glass jars or tins. They should be packed fairly loosely and covered (sirup or juice).

In the *cold pack method,* the cold raw fruit is put into containers and then covered with hot liquid (sirup, water or extracted juice). Since the fruits shrink during the processing, raw foods may be packed tighter than hot foods. To be specific, raw tomatoes may be canned without liquid by pressing them down tightly into the containers so as to cover them with their own juice.

When *packing in glass,* work the blade of a knife down the sides of the jar to remove air bubbles. Then, add more liquid to cover the fruit. Large fruits had best be placed in jars with kitchen tongs rather than just "filled in."

When *packing in tin,* heat the filled open cans. The temperature of the fruit must be at least 170°F when the cans are sealed. *Exhausting,* as this process is known, drives out the trapped air, helps to prevent loss of flavor and discoloration, and keeps the can ends concave.

To *exhaust tin cans,* place the filled open cans in a large kettle containing boiling water to about 2 inches below the tops of the can. Cover the kettle, bring the water to a boil and boil steadily for 10 minutes.

After exhausting, add more liquid if necessary and seal at once.

5. *Watch your time table.*
   Process in boiling water bath for the length of time recommended in the particular procedures.

6. *Make sure jars and tins are hermetically sealed.*

7. *Label and store in cool, dry place.*

Evaluate your product:

Appearance: color — *as near as the natural food as possible*
clearness — *sirup or liquid clear and free from seeds and sediments.*

size and shape— *uniform*
Texture: *tender* but not overcooked
Palatability: as nearly *like its natural flavor* as possible

CANNED FRUIT COCKTAIL

Assemble these utensils:

- 3 4-quart saucepans
- 5 2-quart utility bowls
- 2 paring knives
- fork
- set of measuring cups
- set of measuring spoons
- 2 colanders
- kitchen scale
- wooden spoon
- 14 12-ounce bottles
- big kettle with rack
- water bath
- sterilizer
- thermometer
- timer

Assemble these supplies:

- 1 rare ripe hard papaya (2 1/2 kilos)
- 1 medium fresh watermelon (4 kilos)
- 6 medium size *sinkamas*
- 2 cups pineapple tidbits
- 1 small honeydew (1 1/2 kilos)
- citric acid
- almond extract

Steps in preparation:

1. Pare and cube papaya 1/2 inch cube. Wash and boil *sinkamas* until they are easily pricked with a fork. Pare and cube.
2. Scoop out honeydew and watermelon balls.
3. Measure cut fruits separately to determine sugar, water, and citric acid to use. Cook fruits separately using the following general proportions for each pint of cubed fruits:
   - 1/2 cup water
   - 1/2 cup sugar
   - 1/4 teaspoon citric acid
   - 3 to 5 drops almond extract (for honeydew, *sinkamas,* and papaya)
4. Combine fruit with the above ingredients except almond extract and bring to a boil. Keep gently boiling for 10-15 minutes. Add almond extract last (measuring carefully). Do this with all the fruits used. *For good results, keep fruits in their sirup overnight.*
5. Drain *sinkamas* from its sirup and combine in equal amount with papaya. Add pineapple tidbit, as much or half as much of honeydew melon balls and one fourth as much as red watermelon balls as pineapple.
6. Combine fruits and pack in clean sterilized jars. Honeydew melon sirup is the one to be used for the sirup of the combined fruits. (If the honeydew melon sirup is not enough, you can prepare another sirup recipe.)
7. Heat the sirup and pour directly to the jars. Remove air bubbles by inserting a knife or by jarring or agitating the jars.
8. Process in boiling water bath for 15-20 minutes.

Yield: 14 12-ounce bottles.

Useful tips for cooking, storing, and serving:

1. Because of texture breakdown, do not attempt to cook a large quantity of papaya at a time when only a home type stove is used. On the other hand, *sinkamas* takes time to cook to the softness of pear. It has to be pressure cooked sometimes but overcooking it is to be avoided as it can turn brown.
2. Serve fruit cocktail for desserts anytime of the day with custard dressing like frozen fruit cocktail.

Evaluate the product:

Appearance: color—*brightly colored,* discolored bleeding of red color, dull, muddy

shape — *whole pieces of fruit,* mashed up, irregularly cut, *well peeled,* with peeling, bruises and black spots, shrunken, shriveled

Texture: *turgid, smooth,* fibrous, hard, lumpy, mushy, soft

Palatability: *pleasingly flavored,* oversweet, sour, strong, tasteless, bitter flavor

CANNED MANGO SCOOPS

Assemble these utensils:

2-quart saucepan
2 2-quart utility bowls
liquid measuring cup
set of measuring spoons
2 utility plates
stainless steel knife and spoon
cloth strainer
table knife
water bath sterilizer with false bottom
2 8-ounce bottles

Assemble these supplies:

6 firm ripe mangoes
sirup (2/3 cups sugar + 1 cup water + 1/2 teaspoon calcium chloride)

Steps in preparation:

1. Wash mangoes thoroughly.
2. Prepare sirup in 2-quart saucepan and strain through a cloth in a bowl. Return to saucepan and keep covered until ready to use.
3. Cut the mangoes into halves with stainless steel knives.
4. With stainless steel spoons, scoop mangoes rapidly. Trim to keep scoop shapely.
5. Pack nicely in glass jars.
6. Pour hot sirup. Remove bubbles with a knife inserted around the edges. Refill with sirup.
7. Seal and process for 20 minutes at 212°F.
8. Cool.

Helpful hint:

The mangoes to be canned should be carefully chosen. The fruits which should be selected are not the eating ripe kind but, rather those that are firm so that they can retain their texture and shape after processing and storage.

Yield: 3 8-ounce bottles.

Evaluate the product:

Appearance: scoops — *golden yellow,* pale yellow, greenish, *good shape, plump, sirupy or lustrous,* broken, dull, translucent, mushy, shrunken, shriveled

sirup — *thin,* watery, thick, *clear,* turbid

CANNED ORANGE SEGMENTS

Assemble these utensils:

kitchen scale
set of measuring spoons
liquid measuring cups
4 8-ounce glass jars

Assemble these supplies:

2 kilos fresh and firm mandarin oranges
lye solution (1 tablespoon NAOH per quart of H_2O)
Acid solution (1 millimeter of hydrochloric acid per quart of H_2O)
sirup (2/3 cup sugar per pint of water)

Steps in preparation:

1. Sort and wash the fruits.
2. Pass fruit through a steam or hot water bath for 1 minute to facilitate peeling and then cool in cold water.
3. Peel the fruit by hand and separate into segments.
4. Immerse segments in a fruit basket in lye solution for 1 minute at 180°F.
5. Wash with water once. Dip in acid solution to neutralize the alkali.
6. Wash thoroughly with water. Remove peeling well.
7. Pack well in glass jars and add hot sirup. Remove bubble with a knife inserted around the edges. Refill with sirup.
8. Seal and process for 20 minutes at 212°F.
9. Cool.

Yield: 4 8-ounce glass jars.

Evaluate the product:

Appearance: *whole,* mushed up. smooth, *no seed and pulp,* many seeds and pulp

Texture: *turgid,* dry, tough

Palatability: *pleasingly flavored,* very sweet, flat, bitter

CANNED PINEAPPLE

Assemble these utensils:

4-quart saucepan
kitchen knife
chopping board
2 2-quart utility bowl
utility plate
measuring cups
thermometer
pressure canner or a big kettle with rack for processing
3 8-ounce clean sterilized jars

Assemble these supplies:

1 fresh pineapple (2 1/2 kilos)
1 cup sugar
2 cups water

Steps in preparation:

1. Blanch the fruit for 4 minutes and peel about 1/2 centimeters thick. Remove the eyes with the point of a sharp knife.
2. Cut the cleaned fruit into squares, or into any desired pieces, taking care that the slices are uniform in shape and size.
3. Wash them thoroughly in cold water.
4. Prepare a medium sirup (1/2 cup sugar plus 1 cup water).
5. Pack the slices in jars or cans and pour hot sirup over the filled containers.
6. Exhaust at 180°F for 5-10 minutes.
7. Process in boiling water for 40 minutes or in a pressure cooker at 10 pounds pressure (240°F) for 15 minutes.

Yield: 3 8-ounce bottles.

Evaluate the product:

Appearance: color — *yellow,* pale yellow, darkened
shape — *pieces are uniformly cut and are free from eyes or bits of eyes,* disintegrated
sirup — *thin,* thick, cloudy, with peels and bits of eyes

Texture: *tender, firm,* mushy, fibrous, soft

Palatability: *pleasingly sweet,* too sweet, bitter, salty, flat

CANNED WHOLE TOMATOES

The calcium chloride will preserve the shape and texture of the tomatoes.

Assemble these utensils:

kitchen scale
wire basket or thin cloth
4-quart saucepan
kitchen knife
cutting board
table knife
set of measuring spoons
liquid measuring cup
4 8-ounce bottles or 2 No. 2 cans
pressure canner
thermometer
timer

Assemble these supplies:

1 kilo firm ripe tomatoes
1 teaspoon salt
2 grams calcium chloride

Steps in preparation:

A. Raw Pack

1. Wash tomatoes thoroughly, taking care not to bruise them.
2. Put tomatoes in a wire basket or thin cloth, into a kettle of boiling water. Remove after about 1/2 minute and dip quickly into cold water.
3. Cut out stem ends and peel tomatoes. Leave tomatoes whole or cut in halves or quarters.
4. Pack tomatoes:
   a. in glass jars: pack to 1/2 inch of top, pressing

gently to fill spaces. Add no water. Add 1/2 teaspoon salt and 1/8 teaspoon calcium chloride to pints.

   b. In tin cans pack tomatoes to top of cans, gently to fill spaces. Add no water. Add 1/2 teaspoon salt and 1/8 teaspoon calcium chloride to No. 2 cans; 1 teaspoon salt and 1/4 teaspoon of calcium chloride to No. 2 1/2.

5. Exhaust at 170°F for 15 minutes.
6. Seal and process in boiling water bath.
   a. pint jars — 85 min.
   b. No. 2 cans — 45 min.
   c. No. 2 1/2 cans — 55 min.
7. Cool and store.

B. Hot Pack
   1. Quarter peeled tomatoes.
   2. Bring to boil; stir to keep tomatoes from sticking.
   3. Pack tomatoes boiling hot in glass jars to 1/2 inch of top. Add the same amount of salt and calcium chloride as the raw pack.

      In tin cans, pack boiling-hot tomatoes to 1/4 inch of top. Add the same amount of salt and calcium chloride as the raw pack.
   4. Exhaust to 170°F for 10 minutes.
   5. Seal and process in boiling water bath (212°F) for 10 minutes.
   6. Cool and store.

Yield: 4 8-ounce bottles or 2 No. 2 cans.

Evaluate the product:

Appearance: Color — *uniform deep red,* pale red, light-yellow, purple, brown, dark brown

shape — *good shape,* irregular shape, plump, broken, mushy, shrunken, shriveled

Texture: *firm, smooth, tender,* lumpy, mushy, watery, soft

Palatability: *slightly salty,* flat, bitter, very salty

LABORATORY PROBLEM 39 Pressure Canning of Vegetables

GENERAL DIRECTIONS FOR CANNING VEGETABLES

1. *Select your products.*

Preserve only young, tender vegetables at the peak of perfection. Overripe, stale or bruised products are not going to improve with canning.

Sort them for size and ripeness. They will then cook more evenly and give you a more uniform product.

2. *Check your equipment.*

Have food jars and processing equipment ready and thoroughly clean. Check the equipment list at the beginning of each procedure. See the general directions for canning in Section 11 for a complete list of equipment for home canning.

3. *Work quickly to conserve "freshness."*

The ideal is "TWO HOURS FROM GARDEN TO CAN." This will avoid deterioration. If you must hold them, keep them in a cool, airy place.

4. *Choose your method.*

Refer to the manner in which food is prepared and packed.

In general, wash vegetables thoroughly in small lots. Don't let them soak in water. Handle them carefully, so as not to bruise them. Wash crisp greens in two baths of warm water first to remove any soil and then to give them a final cold water rinse.

Cut vegetables in uniform sizes, if desired.

BLANCH VEGETABLES BEFORE CANNING

Blanching has several advantages: it shrinks the product, making it possible to pack and feed into the containers; drives the air out of the cells of the vegetables and thus minimizes loss of nutrients through oxidative changes; fixes the green color of vegetables; and stops enzymatic changes.

To blanch means to precook the vegetables in just enough boiling water to cover them for a few minutes before packing them into jars or cans. The blanching water may then be used to fill the containers since it contains water-soluble vitamins.

Pack the hot vegetables loosely in hot sterilized jars to within 1/2 inch of the top except for corn, peas, and limas which need 1 inch headspace. Pack the vegetables attractively in glass jars. For example, long vegetables like string beans are interesting if kept whole and packed lengthwise. Use kitchen tongs to do this.

When packing in cans, fill to 1/4 inch with vegetables. Then fill to top with boiling hot blanching water. Add salt — 1 teaspoon per quart. As for glass jars, leave 1/2 inch headspace.

Should the blanching water run short or have an off-flavor, use boiling water instead.

Remove air bubbles in jars or cans by working the blade of a knife up and down the sides of the containers. Add more liquid if necessary.

Seal jars or cans.

Exhaust tin cans by placing the open filled cans in a large kettle with boiling water 2 inches below the top of the cans. Cover the kettle, bring the water to a boil and boil for 10 minutes or until the center of the can reaches 170°F. Remove the cans from the water one at a time and replace any liquid loss in the process. Seal at once.

5. *Watch your time table.*

Process in a pressure canner at 10 pounds pressure (240°F) for the length of time recommended. See the general directions for pressure canning in Section 11.

Spoilage may result from underprocessing or undercooking.

At the end of the processing period, remove the containers from the pressure canner. Cool.

6. *Make sure jars and cans are hermetically sealed.*
7. *Store the foods in a cool, dry place, but only after you have labeled them intelligently.*

CANNED CREAM-STYLE CORN

Assemble these utensils:

kitchen knife
chopping board
2-quart utility bowl
set of measuring spoons
liquid measuring cup
2 No. 2 cans or
2 8-ounce glass jars
pressure canner
thermometer
timer

Assemble these supplies:

5 medium size fresh corns (approximately 1 1/2 - 2 cups kernels)
1 teaspoon salt

Steps in preparation:

A. Raw Pack

1. Husk corn and remove silk.
2. Wash and cut corn from cob at about center of kernel and scrape cobs with the back of a strong knife.
3. Pack corn in pint jars to 1 inch of top and in tin cans to 1/2 inch of top. Do not shake or press down.
4. Fill to top with boiling water. Add 1/2 teaspoon salt to each container.
5. Exhaust to 170°F (about 25 minutes).
6. Seal and process in pressure canner at 10 pounds pressure (240°F) pint jar for 95 minutes; No. 2 cans for 105 minutes.
7. After processing, complete the sealing of glass jars.
8. Cool, label, and store.

B. Hot Pack

1. Do the first 2 steps in raw pack.
2. To each pint of corn add 1 cup boiling water.
3. Heat to boiling.
4. Pack hot corn in pint jars to 1 inch of top and No. 2 cans to top. Add 1/2 teaspoon salt to each container.
5. Exhaust to 170°F (about 10 minutes).
6. Seal and process in pressure canner at 10 pounds pressure (240°F) pint jars for 85 minutes and No. 2 cans for 105 minutes.
7. Complete the sealing of glass jars.
8. Cool, label, and store.

Helpful hint:

Frozen corn can ideally be canned as cream-style corn.

Evaluate the product:

Appearance: color — *golden yellow,* pale yellow, brownish, *shiny* or *lustrous*

shape — *plump kernel,* broken kernels, mushy

sirup — *thin,* thick

Texture: *firm, tender,* mushy, fibrous, soft

Palatability: *pleasing corn flavor,* raw, flat

CANNED ABITSUWELAS (SNAPBEANS)

Assemble these utensils:

kitchen scale
kitchen knife
chopping board
set of measuring cups
2-quart saucepan
3 8-ounce clean sterilized jars or 2 No. 2 tin cans
big saucepan or kettle with a rack
pressure canner
thermometer
timer

Assemble these supplies:

1/2 kilo abitsuwelas (snapbeans)
salt
1 to 2 teaspoons of salt per quart of water

Steps in preparation:

1. Wash thoroughly and trim.
2. Cut into convenient lengths (1 1/2 to 2 inches). Can the small ones uncut.
3. Blanch the beans in steam or boiling water for 2 minutes. Let it cool.
4. Fill the cans or bottles with the beans. A boiling hot brine solution made by adding 1-2 teaspoons of salt per quart of water is added.
5. Process glass jars (8-ounce) or No. 2 cans at 10 pounds pressure (240°F) for 40 minutes or 250°F for 20 minutes; 2 1/2 cans at 240°F for 60 minutes or 250°F for 50 minutes.

Yield: 3 8-ounce bottles.

Evaluate the product:

Appearance: color — *olive green,* faded green, brownish, grayish

shape — *uniform sizes, whole pieces,* disintegrated

Texture: *fleshy,* mushy, soft, *tender,* fibrous

Palatability: *pleasing flavor,* too salty, bitterish, flat

CANNED PEPPER

Assemble these utensils:

kitchen scale
2-quart saucepan
2-quart utility bowl
big kettle or saucepan with rack
thermometer
pressure canner
2 No. 2 cans or
3 8-ounce clean sterilized jars
timer

Assemble these supplies:

1 kilo fresh, firm red sweet bell pepper

Solution of:

2-4 grams calcium hydroxide or calcium chloride in a quart of water

1-2 grams citric acid

ly solution (5 grams NaOH for every cup of water)

Steps in preparation:

1. Wash and trim pepper.
2. Soak cubed pepper for 1/2 hour and pepper halves for 2 1/2 hours in lime solution.
3. Wash and rinse; blanch for 2 minutes in lye solution or place in a moderate oven 6-8 minutes.
4. Remove skin; wash again.
5. Pack hot into No. 2 cans or bottles and cover with a hot aqueous solution containing 1-2 grams citric acid per pint of water.
6. Exhaust at 180°F for 5-10 minutes.
7. Seal and process for 40 minutes in water bath or 10 minutes in a pressure canner at 10 pounds pressure (240°F).
8. Cool and store.

Yield: 3 8-ounce bottles or 2 No. 2 cans.

Evaluate the product:

Appearance: *retained its color,* faded, discolored, *uniform size,* disintegrated, mashy

Texture: *firm, crisp,* mushy, disintegrated, very soft

Palatability: *pleasingly flavored,* bitter, salty, acid

REFERENCES

1. Anonymous, "Chemistry and Technology of Citrus, Citrus Product, and By-product." U.S. Government Printing Office, Washington, D.C. 1962.
2. Anonymous; "Home Canning of Fruit and Vegetables." USDA Home and Garden Bulletin No. 8. U.S. Government Printing Office, Washington, D.C.
3. Cruel, C.P. 1962. *pH and Pectin Determination of Ten Philippine Fruits.* U.P. B.S.F.T. thesis. Unpublished.
4. Cruess, N.Y., *Commercial Fruit and Vegetable Products,* (New York. McGraw Hill Book Co., Inc., 1958).
5. Gonzales, O.N., J.G. Palad, and A. Brillante. 1963. "Comparative Analytical Data of Some Philippine Fruits." *Philippine Journal of Science,* 92(1):17-34.
6. Guzman, M.P., *Laboratory Procedures in Food Preservation.* U.P. College of Home Economics. Unpublished.
7. Tongson, M.Q. 1962. *Calcium Firming of Mango Scoops.* U.P. B.S.F.T. thesis. Unpublished.
8. Villanueva, E.P. 1960. *Color, Texture Development of Maraschino Style Papaya.* U.P. B.S.F.T. thesis. Unpublished.

SECTION FOURTEEN

Canning of Fish and Meat

Meat is the center of the meal, around which we oftentimes plan the rest of the menu. It is an expensive item, therefore, it is imperative that we learn to preserve it for the morrow. There are ways of preserving them for a day, others for preserving them for weeks, but here is how to preserve them for months and months.

Helpful hints to the teacher:

The third lesson should re-echo the seven points for success in food processing. Stress especially the process time and temperature. Review the proper use and care of the pressure canner.

It may be best at this stage to discuss food poisoning as well. Ask the students to prepare a table showing the different types of food poisoning and the characteristics of the toxin, the mortality, symptoms, causes and methods of prevention. (See end of manual.)

LABORATORY PROBLEM 40 Pressure Canning of Fish and Meat

CANNED BANGUS (MILK FISH), SARDINE STYLE AND SALMON STYLE

Assemble these utensils:

kitchen knife
cutting board
2-quart utility bowl
set of measuring cups
set of measuring spoons
pressure canner
large kettle or steamer with rack
2 No. 2 cans

Assemble these supplies:

2 medium-sized bangus
4 tablespoons tomato sauce
2 tablespoons oil
dash of salt
1 teaspoon monosodium glutamate (MSG)

Steps in preparation:

1. Wash and scale the fish.
2. Cut off the fins and heads.
3. Open the soft belly to remove the viscera, blood, kidney, and peritoneum with the aid of a brush and running water.
4. Wash the dressed fish thoroughly.
5. Cut into can-length sizes on a cutting board prepared for the purpose.
6. Wash and soak in concentrated brine solution for 10 to 20 minutes depending on the size of the fish. Wash and rinse well with plain water.

7. Pack in cans.
8. Exhaust for ten minutes at 180°F.
9. Add 2 tablespoons each of hot concentrated tomato sauce and 1 tablespoon refined oil and 1/2 teaspoon MSG in each can.
10. Seal completely.
11. Process for 120 minutes at 10 lbs. pressure (240°F).
12. Cool the cans immediately in running water.
13. Dry and label properly.

Yield: 2 No. 2 cans.

Helpful Hint:

For salmon style, follow the above directions but replace the oil and tomato sauce with equal amounts of hot water.

Evaluate the product:

Appearance: color — *orange-reddish* color, pinkish in color, grayish, muddy pale
shape — *whole, not mashy,* mashy, disintegrated, crumbly
Texture: *tender,* tough, soft, mashy
Palatability: *well-seasoned,* no fishy taste, salty, fishy, stale, flat, bitter, burnt, raw flavor.

CANNED FISH BALLS

Assemble these utensils:

- kitchen scale
- liquid measuring cup
- set of measuring spoons
- skillet or frying pan
- meat grinder
- 2-quart utility bowl
- tablespoon
- pressure canner
- steamer or large saucepan with rack
- thermometer
- timer
- 2 No. 2 cans

Assemble these supplies:

- 1 kilo fish meat (*talakitok, lapu-lapu* or *apahap* will do)
- 1/2 cup milk
- 1/2 cup fish broth (made by simmering the fish bones in a little water for 1 hour)
- 3 tablespoons flour
- 1 tablespoon patis
- nutmeg to taste
- pepper to taste
- ginger to taste
- hot oil for frying
- tomato sauce, optional

Steps in preparation:

1. Put the meat through a 1/8" hole meat grinder. Use all the meat that can be scraped from the bone.
2. Mix together the following ingredients until smooth: milk, fish broth, flour, *patis,* nutmeg, pepper, ginger and tomato sauce.
3. Mix in the ground fish.
4. Make the paste into balls about 1 inch thick.
5. Fry the balls in hot oil at 375°F for 30 seconds to 1 minute or until a light brown in color.
6. Fill balls into 2 cans with hot fish broth or a light tomato sauce.
7. Exhaust at 180°F for 10 minutes.
8. Process for 90 minutes at 240°F.
9. Store and cool.

Yield: 2 No. 2 cans.

Evaluate the product:

Appearance: Exterior—*round, plump, whole,* disintegrated, *uniform size,* uneven, irregular, *well-browned,* pale, burned.

Interior — *moist,* watery, dry, very dry, even color throughout.

Texture: *does not crumble,* solid, pasty, light, *fairly compact,* very compact, *definite texture,* lump and tough.

Palatability: *well-seasoned,* flat, greasy, row, burned, highly seasoned, *well-blended,* poorly blended.

CANNED FISH CHOWDER

Assemble these utensils:

kitchen scale
kitchen knife
cutting board
2 2-quart bowls
set of measuring cups
measuring spoons
wooden spoon
2 utility plates
skillet or frying pan
2-quart saucepan
5 No. 2 clean cans

Assemble these supplies:

For every kilo of fish meat (*apahap, talakitok, alumahan* or *torcillo* will do) use:

1/2 kilo salted pork
1/4 kilo onions
1 tablespoon salt
1/4 teaspoon white pepper
1/4 cup flour
1/2 kilo potatoes

Steps in preparation:

1. Cut salted pork and onions into small cubes. Saute them together until soft but not brown.
2. Wash fish, remove the fleshy portions and internal organs separately.
3. Simmer the heads and backbones of the fish for at least one hour. Remove the bones and scraps.
4. To 1 quart of cold fish broth, add 1 tablespoon salt and 1/4 teaspoon white pepper. Stir in 1/4 cup flour until the mixture is smooth. Allow to simmer until ready for use.
5. Cut the fish flesh and potatoes into 1/2" cubes just before using and put 3/4 cup of each in pint glass jars or No. 2 cans. (The fish cubes can be slightly sauteed or blanched in boiling water if the type of fish used falls apart easily.)
6. One-half cup of hot fish broth should be added to each can and the container sealed immediately.
7. Process No. 2 cans at 240°F or 10 pounds for 80 minutes and the pint jar for 90 minutes at the same temperature.
8. Cool, label and store.

Yield: 5 No. 2 cans.

Evaluate the product:

Appearance: Fish and meat — *whole,* mashy, disintegrated, *moist,* dry, crumbly.

potatoes—*whole, uniform pieces,* mashy, disintegrated, dry

Texture: Fish and meat — solid, crumbly, *tender,* hard, tough

Potatoes—hard, dry, *smooth* mealy

Palatability: *delicate flavor,* flat, strong fishy taste or odor, stale, sound, *well-seasoned,* salty, flat, bitter.

CANNED FISH FLAKES

Assemble these utensils:

kitchen scale
4-quart utility bowl
utility plate
pressure cooker
steamer or large kettle with rack
thermometer
pressure canner
timer
3 No. 2 cans

Assemble these supplies:

1 1/2 kilos *lapu-lapu* flesh
salt
tomato sauce (optional)

Steps in preparation:

1. Remove the viscera and scales from the fish.
2. Wash the fish well inside and outside.
3. Soak in saturated brine for 6 to 12 hours. Wash and rinse well.
4. Steam from 15-30 minutes in a pressure cooker at 250°F. Cook well, but not until completely disintegrated.
5. Remove the flake of fish from the skin and bones.
6. Fill the flakes tightly into No. 2 C-enameled cans.
7. Exhaust 15 minutes at 210 to 212°F in a steam bath before sealing.
8. Process for 90 minutes at 240°F.

Yield: 3 No. 2 cans.

Evaluate the product:

Appearance: *whole,* mashy, disintegrated, *moist,* dry, crumbly

Texture: *flaky,* solid, compact, crumbly, *tender,* hard, tough.

Palatability: flat, *delicate flavor,* strong fishy taste or odor, stale, *well-seasoned,* salty, flat, bitter

LABORATORY PROBLEM 41 Pressure Canning of Chicken

CANNED CHICKEN PORK ADOBO

Assemble these utensils:

kitchen knife
4-quart bowl
basting spoon
liquid measuring cup
set of measuring spoons
kitchen scale
mortar and pestle
3 No. 2 cans
steamer or large saucepan with rack
pressure canner
thermometer
timer

Assemble these supplies:

1 kilo chicken (meaty portion only)
600 grams pork with 1/2" fat
200 grams liver (pork)
1 cup vinegar, native
2 heads garlic
4 tablespoons salt, coarse
1 teaspoon *toyo*
1/2 teaspoon peppercorn
1 to 2 tablespoons fat

Steps in preparation:

1. Cut chicken into serving pieces, cut pork into 2" cubes and pound liver. Pound also the garlic and peppercorn.
2. Combine all ingredients. Allow to stand one hour if time will permit. (It is preferable to let *adobo* stand in the vinegar and seasoning overnight before cooking.)
3. Cook to boiling point. Regulate the heat and keep the liquid simmering. Cook in a covered container until meat is tender.
4. Transfer cooked mixture into a bowl.
5. Place a tablespoon or two of fat in the pan and brown cooked pieces of pork and chicken.
6. Fry the garlic in the sauce (stock) till brown. Extract the juice of the pounded liver. Add juice to the browned garlic and cook till sauce is thick. Pour sauce over chicken and pork.
7. Pack in No. 2 cans or 2 1/2 cans and heat until cold point (center) reaches 170°F.
8. Seal cans immediately. Process for 30-40 minutes at 10 pounds pressure or 240°F. Cool.

Yield: 3 No. 2 cans

Evaluate the product:

Appearance: *whole,* mashy, disintegrated, *well-seasoned,* pinkish chicken pieces, burned, pale

Texture: *tender,* tough, hard, leathery, soft, mashy

Palatability: *pleasingly seasoned,* flat, salty, sour, spicy, bitter

CANNED CHICKEN SPREAD

Assemble these utensils:

kitchen scale
2 4-quart mixing bowls
kitchen knife
chopping board
3-quart saucepan
meat grinder
measuring cup

Assemble these supplies:

500 grams of chicken
23 grams of onion
14 grams of salt
7 grams of garlic
1.2 grams of mace
3 grams of bay leaf
2 cups water
2 grams white pepper
2 grams of paprika
42 grams of monosodium glutamate
15 grams of non-fat dry milk
5 grams of cornstarch
1/2 cup of chicken broth

Steps in preparation:

1. Weigh chicken and other ingredients.
2. Cut chicken into pieces and place in a kettle with salt, onion, garlic, mace and bay leaves.
3. Add water and cook chicken till tender.
4. Remove chicken from kettle.
5. Weigh the edible portion of chicken.
6. Grind into a fine paste in a meat grinder.
7. Add remaining ingredients and mix thoroughly by passing it once more in the grinder.
8. Add chicken stock.
9. Place in cans with a net weight of 85 grams.
10. Exhaust at 170°F and seal.
11. Process at 10 pounds pressure for twenty minutes.
12. Cool.

Evaluate the products:

Appearance: *white,* grayish, dull brown, with specks of spices.

Texture: *fine,* coarse, unevenly ground, *smooth, spreadable,* pasty, dry, crumbly.

Palatability: *well-seasoned,* spicy, flat, peppery, salty, bitter.

LABORATORY PROBLEM 42 Pressure Canning of Pork

CANNED GUISADO MIX

Assemble these utensils:

- kitchen scale
- kitchen knife
- cutting board
- 2-quart saucepan
- skillet or frying pan
- basting spoon
- colander
- 2-quart utility bowl
- big kettle or steamer with rack
- pressure canner
- 2 utility plates
- thermometer
- timer
- 6 No. 2 cans

Assemble these supplies:

- 1 1/2 kilos pork (*pigi*)
- 1 kilo medium-sized fresh shrimps
- 190 grams onion, sliced
- 45 grams garlic, slightly pounded
- 1 teaspoon vetsin (MSG)
- 1 tablespoon *patis* or salt (enough to taste)
- shrimp stock, enough to fill cans

Steps in preparation:

1. Separate lean from fat. Remove skin.
2. Cut lean and fat into 1/2 inch cubes. Slice the skin finely.
3. Parboil cubed lean meat in small amount of water.
4. Render fat from pork.

5. Saute garlic, onion and add pork.
6. Add boiled shelled shrimps. Before parboiling fresh shrimps, cut off head which will be pounded and strained to obtain stock. Add boiling water to shrimps and cook until it becomes pink. Drain at once and shell. Add hot shrimp stock, *patis* or salt. Drain through a colander.
7. Fill No. 2 cans (or 16-ounce jars) with 400 grams of solid; then add the stock to make 550 grams.
8. Exhaust till it reaches 180°F.
9. Seal at once and process at 10 pounds for 50 minutes.

Yield: 6 No. 2 cans.

Evaluate the product:

Appearance: shrimps and pork — *pinkish,* grayish brown, dark brown, brown, off-color shape — *whole, distinct pieces,* mashy, disintegrated

Texture: *tender, firm,* soft, hard mashy

Palatability: flat, *delicate flavor,* strong fishy taste or odor, stale, *well seasoned,* salty, spicy, bitter

CANNED PORK ADOBO

Assemble these utensils:

- sharp knife
- chopping board
- kitchen scale
- 4-quart utility bowl
- basting spoon
- strainer
- 2-quart saucepan
- pressure canner
- big kettle or saucepan with rack
- sealer
- thermometer
- timer
- 12 F cans (8.89 ounces)

Assemble these supplies:

- 2 kilos lean pork with fat
- 1 cup vinegar
- 1/2 teaspoons black pepper, ground
- 1 tablespoon refined salt
- 1 1/2 tablespoons pounded garlic
- 1/3 cup soy sauce
- 1 teaspoon monosodium glutamate (vetsin)

Steps in preparation:

1. Cut pork into 2 inch cubes.
2. Combine pork with condiments. Marinade overnight in the refrigerator.
3. Cook to boiling.
4. Separate the stock or sauce from the meat and continue boiling the stock for 10 minutes.
5. Brown the meat and add soy sauce.
6. Weigh into cans (about 230 grams for 1 can).
7. Add the sauce.
8. Exhaust at 180°F for 5 minutes.
9. Seal and process for 30 minutes at 15 pounds pressure.
10. Cool, label, and store.

Yield: 12 F cans.

Evaluate the product:

Appearance: color — *well browned,* burned, pale
shape — *whole,* mashy, disintegrated

Texture: *tender,* soft, tough, hard, leathery, mushy

Palatability: *pleasingly seasoned,* flat, salty, sour, juicy, bitter

CANNED PORK ADOBO SPREAD

Assemble these utensils:

chopping board
sharp knife
kitchen scale
2 bowls
mortar and pestle
basting spoon
strainer
2 utility plates
meat grinder
2-quart saucepan
pressure canner
thermometer
timer
18 1/2-ounce cans

Assemble these supplies:

2 kilos pork (with fat)
1 cup vinegar
2 tablespoons garlic, pounded
1 1/2 tablespoons refined salt
1 1/2 tablespoons black pepper, ground
1 teaspoon vetsin (MSG)
1/3 cup *toyo* (soy sauce)
2 1/2 tablespoons cornstarch

Steps in preparation:

1. Cut the meat into 1 1/2 inch cubes.
2. Weigh the ingredients.
3. Mix the vinegar, salt, garlic, and pepper with the cubed meat.
4. Store in the refrigerator overnight.
5. Boil the mixture. Separate the sauce from the meat. Continue boiling the sauce for about 10 minutes.
6. Brown the meat. Add soy sauce.
7. Grind the mixture again.
8. Add the cornstarch and sauce. Mix well.
9. Grind the mixture again.
10. Pack in cans.
11. Exhaust at 180°F for 5 minutes.
12. Seal.
13. Process at 10 pounds pressure for 40 minutes.
14. Cool, label, and store.

Yield: 18 1/2-ounce cans.

Evaluate the product:

Appearance: *slightly moist,* fatty, dry, *well browned,* pale, burned

Texture: *finely ground,* coarsely ground, tender, fibrous, stringy, *spreadable*

Palatability: flat, *well-seasoned,* sour, greasy, burned, spicy, extremely salty, *well blended,* poorly blended

CANNED PORK AND BEANS

Assemble these utensils:

4-quart saucepan
2-quart saucepan
kitchen scale
2 2-quart utility bowl

pressure canner
liquid measuring cup
thermometer
set of measuring spoons
large saucepan or steamer with rack
6 No. 2 cans
timer

Assemble these supplies:

1 kilo dry kidney or navy beans
4 cups tomato sauce
4 cups soaking liquid from beans
1 tablespoon salt
pieces of salt pork

Steps in preparation:

1. Sort and wash dry beans. Soak them in water for 15 hours or overnight.
2. Immerse in boiling water for 5 minutes and drain. Save liquid for making sauce.
3. Make the sauce by mixing the tomato sauce and the liquid from the soaked boiled beans with a proportion of 1:1.
4. Fill containers 2/3 full with hot prepared beans (approximately 250 grams). Add small pieces of salt pork and add the tomato sauce leaving 1/2 inch at top of glass jars and tin cans for headspace.
5. Exhaust at slow boiling about 15 minutes.
6. Seal and process in steam canner at 10 pounds pressure (240°F) for 65 minutes.

Yield: 6 No. 2 cans.

Helpful hints:

In the absence of tomato sauce, combine the following:

1 quart tomato juice
3 tablespoons sugar
2 teaspoons salt
1 tablespoon chopped onion
1/4 teaspoon mixture of ground cloves all spice mace and cayenne

Evaluate the product:

Appearance: *whole distinct pieces,* mashed up, *good proportion of pork and beans*

sauce—*thick red,* thin pale red, watery

Texture: beans—*tender throughout,* tough inside, starchy, raw, *well cooked,* overcooked

pork—*cooked, tender,* tough

Palatability: *well-seasoned,* flat, salty, spicy, bitter

CANNED PORK "CALDERETTA"

This is not truly calderetta, but it is a delicious pork combination anyway.

Assemble these utensils:

butcher's knife
mortar and pestle
2 utility plates
chopping board
2 saucepans
basting spoon
pressure canner
20 buffet cans
thermometer
timer

Assemble these supplies:

- 3 1/2 kilos pork *pata* (hocks)
- 1/4 cup garlic
- 1/2 cup onions
- 3 tablespoons red pepper
- 3 tablespoons green pepper
- 1/4 cup ground peanut
- 1/3 cup soy sauce
- 1 cup vinegar
- 1 teaspoon black pepper, ground
- 1 cup potato cubes
- 1 teaspoon vetsin (MSG)
- 1 can liver spread

Steps in preparation:

1. Weigh pork *pata.*
2. Cut *pata* into pieces approximately 1 1/2 inch cubes.
3. Grind peanut and garlic.
4. Cut green and red pepper into 1 inch square.
5. Mix pork *pata,* black pepper, salt and garlic (1/2 of the total amount needed) in a saucepan.
6. Boil the mixture until it is almost dry.
7. Saute the rest of the garlic and onions.
8. Add the *pata* and cook until tender.
9. Add ground peanuts, liver spread, sliced green and red pepper and potato cubes.
10. Fill cans (about 370 grams). Add sauce.
11. Exhaust to 180°F for 5 minutes.
12. Seal cans. Process at 15 pounds for 60 minutes.
13. Cool, label, and store.

Yield: 20 buffet cans.

Evaluate the product:

Appearance: meat — *whole,* mushy, disintegrated
sauce — blackish, *creamy brown, thick,* very thick, medium, thin
Texture: soft, *tender,* tough, fibrous, hard
Palatability: *pleasingly flavored,* very salty, sour, flat, spicy, bitter

CANNED PORK DINUGUAN

When it's canned, there'll be no fuss, no mess, when you want to have *dinuguan* and *puto.*

Assemble these utensils:

- kitchen knife
- 2 utility plates
- chopping board
- bowl
- basting spoon
- pressure canner
- large kettle or steamer with rack
- basin
- tablespoon
- 2 No. 2 cans
- thermometer
- timer

Assemble these supplies:

- 1/2 kilo internal organs (stomach, liver, etc.)
- 1/2 kilo lean meat
- 1/4 kilo pork fat
- 2 teaspoons refined salt
- 1 teaspoon refined sugar
- 1 teaspoon black pepper, ground
- 1 teaspoon vetsin (MSG)
- 1 teaspoon garlic
- 1/2 cup vinegar
- 2 tablespoons green pepper
- 1 cup blood

Steps in preparation:

1. Cut and separate the lean meat from the pork fat.

2. Cut the lean meat and internal organs into 1 centimeter cubes.
3. Cut the pork fat and fry until brown.
4. Remove the lard leaving a little for browning the garlic.
5. Brown the lean meat and internal organs.
6. Combine the browned lean meat and pork fat.
7. Add the ground pepper, salt, and vetsin. Mix very well.
8. Add vinegar and let boil for 12-15 minutes.
9. Add the strained blood. Mix the sugar and green pepper and mix.
10. Boil for 5 minutes.
11. Separate the sauce from the meats.
12. Weigh the meats into cans (about 520 grams). Add the sauce.
13. Exhaust to 180°F for 5 minutes. Seal.
14. Process for 60 minutes at 15 pounds pressure.
15. Cool, label, and store.

Yield: 2 No. 2 cans.

Evaluate the product:

Appearance: sauce — *black,* very thick, *thick,* thin
meat — *uniformly cut, whole,* mushy, disintegrated
Texture: *tender,* soft, slightly tender, tough, fibrous
Palatability: *pleasingly flavored,* very sour, sour, salty, flat

CANNED PORK LIVERSPREAD

Assemble these utensils:

kitchen knife
2-quart saucepan
chopping board
meat grinder
kitchen scale
basting spoon
double boiler
2 utility plates
thermometer
pressure canner
timer
10 liverspread cans

Assemble these supplies:

1/2 kilo pork liver
1/3 kilo pork fat
2 teaspoons salt
2 grams salitre (saltpeter)
1/3 cup vinegar
1 teaspoon white pepper, ground
1/2 teaspoon marjoram
1/4 teaspoon paprika
1/4 teaspoon onion salt
1/4 teaspoon garlic salt
2 teaspoons fresh garlic
1/2 teaspoon garlic salt
2 teaspoons vetsin (MSG)
2 tablespoons cornstarch
1/2 cup gelatin from pig's skin
1/2 cup water
2 teaspoons powdered milk (optional)

Steps in preparation:

1. Cut liver into 1 inch cubes after removing the large veins.
2. Cut fat into 1 inch cubes.
3. Mix together vinegar, salitre, garlic, salt, pepper, and vinegar.

4. Marinade liver and fat in the mixture and keep in the refrigerator overnight.
5. Next day, grind the mixture together.
6. Add cornstarch, milk, nutmeg, paprika, onion, marjoram, vetsin, and gelatin to the mixture.
7. Mix and grind again.
8. Heat mixture in a double boiler to 160°F for 5 minutes.
9. Fill into cans (about 85 grams net weight for small cans).
10. Exhaust at 170°F for 5 minutes.
11. Seal immediately.
12. Process for 50 minutes at 240°F.
13. Cool, label, and store.

Yield: 10 liverspread cans.

Evaluate the product:

Appearance: *dull brown,* pinkish, with spice pecks, with other extraneous material

Texture: *fine,* coarse, unevenly ground, *smooth, spreadable,* pasty

Palatability: *well-seasoned,* flat, spicy, peppery, salty, bitter

LABORATORY PROBLEM 43 Pressure Canning of Beef

CANNED CORNED BEEF

Assemble these utensils:
- glass jars or cans
- pressure canner
- thermometer
- timer

Supply:
- Previously corned beef (See directions for curing beef in Section 7.)

Steps in preparation:

1. Wash the corned beef and cut into pieces suited for packing.
2. Cover meat with cold water and bring to boil. If the broth tastes very salty, drain and cover meat with fresh water and parboil again.
3. Pack hot meat. Leave about 1 inch above meat in glass jars for headspace; 1/2 inch in tin cans.
4. Cover meat with hot broth or hot water using about 1/2 cup to 3/4 cup for each quart container. Leave 1 inch for headspace in jars; fill cans to top.
5. Work out air bubbles with knife. Add more liquid if needed, to cover meat. Be sure to leave 1 inch for headspace in jars; fill cans to top.
6. Adjust lids on glass jars; seal tin cans.
7. Process at once in steam pressure canner at 10 pounds pressure (240°F) for 75 minutes for pint jars, 90 minutes for quart jars, 65 minutes for No. 2 cans, and 90 minutes for No. 2 1/2 and No. 3 cans.

Evaluate the product:

Appearance: *bright red,* dark brown, light brown, grayish brown

Texture: *tender*, slightly tough, tough, solid, fibrous, crumbly *moist*, dry

Palatability: *pleasingly flavored*, flat, very salty, bitter, slight off flavor

CANNED HAMBURGERS

Assemble these utensils:

kitchen scale
set of measuring spoons
knife
2-quart mixing bowl
utility plate
2 No. 2 cans

Assemble these supplies:

1 pound ground beef (from less tender cuts)
2 tablespoons very finely chopped onions
1 tablespoon flour
1 teaspoon salt
1 teaspoon vetsin (MSG)
dash of pepper (1/8 teaspoon)

Steps in preparation:

1. Mix all ingredients and form into fairly thin cakes that can be packed in glass jars or tin cans without breaking.
2. Put meat cake in cooky sheet. Precook in oven until medium done or when cut red color at center of cake is almost gone.
3. Pack cakes hot up to 1 inch in tin cans.
4. Skim off fat drippings.
5. Cover with meat juice, adding hot water if needed. *Leave about 1 inch above meat in glass jars from headspace; fill tin cans to top.*
6. Work out air bubbles with knife. Add more liquid, if needed, to cover meat.
7. Seal and process at once in the steam pressure canner at 10 pounds pressure (240°F) pint jars for 75 minutes, quart jars for 90 minutes, No. 2 cans for 65 minutes No. 2 1/2 and No. 3 cans for 90 minutes.
8. Cool, label, and store.

Yield: 2 No. 2 cans.

Evaluate the product:

Appearance: exterior — *plump*, shrunken, cracked or broken, *uniform size*, uneven, irregular, *well-browned*, pale, burned

interior — *moist*, watery, dry, very, dry, *even color throughout*, red or pink at the center

Texture: *does not crumble*, solid, *pasty*, light, *fairly compact*, very compact, *definite texture*, lumpy, tough

Palatability: fat, *well-seasoned*, highly seasoned, greasy, raw, burned *well-blended*, poorly blended

REFERENCES

1. Anonymous, *The Canned Food Reference Manuals* (New York: American Can Co., 1939)
2. Avery, A.C. *Fish Processing-Handbook of the Philippines.* (Washington 25, D.C., U.S. Government Printing Office, 1950)
3. Baumgartner, J.Z. and A.C. Hersom, *Canned Foods, an Introduction to Their Microbiology.* 4th ed. (New York: D. Van Nostrand Company, Inc., 1956)
4. Dack, G.M., *Food Poisoning,* rev. ed. (Chicago: University of Chicago Press, 1956)
5. Esselen, W.B. Jr. and C. Fellers, *Causes and Prevention of Failure in Home Canning* (Massachusetts: University of Mass., Amherst, 1950).
6. Esselen, W.B. Jr. and A.S. Levine, *Bacterial Food Poisoning and Its Control — A Review* (Massachusetts University of Mass., Amherst, 1950)
7. Guzman, M.P. *Laboratory Procedures in Food Preservation.* U.P. College of Home Economics. Unpublished.
8. Jarvis, N.D. 1943. *Principles and Methods in the Canning of Fishery Products.* U.S. Government Printing Office. Wash., D.C.
9. Sumulong, M.D. 1953. *Preservation of Meat and Meat Products.* Popular Bulletin No. 24. R.P. Department of Agriculture and Commerce. Bureau of Printing, Manila.

SECTION FIFTEEN

Preservatives

Science has made possible the great variety of food items available in today's supermarkets. Chemical additives have contributed greatly to making these strides in technology possible. The legitimate use of food additives are the maintenance of the nutritional quality of the food, the lengthening of the storage life of the food, making the food more acceptable to the consumer, and providing essential side in food processing. Additives, however, may be employed by unscrupulous manufacturers to disguise the use of faulty processing and handling techniques as to deceive the consumer. The use of these chemicals are likewise objectionable when the result is a substantial reduction of the nutritive value of the food and when the desired effect can be obtained by good manufacturing practices which are economically possible.

Helpful hints to the teacher:

There are a variety of ways of showing the importance of food additives. You may choose from the following suggestions for class activities:

1. Discuss the technological functions of additives following the suggested outline. Emphasize preservatives.
2. Display labels of different types of food encircling any additive listed. Ask students to add information to the poster board regarding the type of additive and its function.
3. Ask the individual product leaders to report on the results of class experiments using chemical additives. Such experiments include:
   a. under refrigeration and freezing — use of ascorbic acid in freezing of fruits.
   b. under fermentation — use of alum in pickles.
   c. under curing of fish and meat — use of saltpeter.
   d. under sugar concentrates — use of powdered pectin in jam and jelly making.
   e. under pasteurization — use of sulfur dioxide or benzoate in juices.
   f. under canning — use of calcium chloride and/or calcium hydroxide in mangoes, tomatoes, and pepper.
4. Assign students to report on journal articles on investigations on the use of chemical additives in various kinds of foods or according to their various technological functions.
5. Test the students with the help of Questionnaire 11.

LABORATORY PROBLEM 44 Uses of Chemical Additives

OUTLINE FOR CHEMICAL ADDITIVES DISCUSSION

Food additives are substances used in various ways to make our food better, safe, and more abundant. Chemical additives may be classified (Desrosier, 1963) as:

A. Types of chemical additives
   1. Intentional additives — substances added on purpose to perform specific functions.
   2. Incidental additives — substances which, though they have no function in the finished food, become part of a food product through some phase of production, processing, storage, or packaging.

B. Functional chemical additive applications are as follows:
   1. Preservatives
      a. microbiological spoilage
      b. chemical deterioration
      c. chemical to control insects and rodents
   2. Nutritional Supplements
      a. vitamins
      b. amino acids
      c. minerals
      d. calories
   3. Color Modifiers
      a. natural coloring matters
      b. certified food dyes
      c. derived colors
   4. Flavoring Agents
      a. synthetic
      b. natural
      c. flavor enhancers or extenders
   5. Chemicals which Affect Functional Properties of Foods
      a. control of colloidal properties
         1. gel
         2. emulsion
         3. foam
         4. suspensoid
      b. firming agents
      c. maturing agents
   6. Chemicals Used to Process Foods
      a. for sanitation, public health or aesthetic purposes
      b. to facilitate the removal of unwanted coverings (skins, hides, feathers, hairs, etc.)
      c. antifoaming agents
      d. chelating agents
      e. yeast nutrients
   7. Chemical to Control Moisture
      a. waxes
      b. anticaking agents
   8. Chemicals Used to Control pH
      a. acids
      b. bases
      c. salts
   9. Chemicals Used to Control Physiological Functions in

Relation to Quality Ripening Agents

a. ripening agents

10. Miscellaneous

a. gases — pressure dispensing

REFERENCES

1. Anonymous, *Food Additives: What Are They? How Are They Used?* (Washington, D.C. Manufacturing Chemist's Association. Inc. 1960)
2. Anonymous, *The Use of Chemical Additives in Food Processing.* A report of the Food Protection Committee of the Food and Nutrition Board. National Research Council Pub. No. 398. Washington D.C. National Research Council, 1960.
3. Anonymous, *What Consumers Should Know about Food Additives.* U.S. Department of Health Education and Welfare Leaflet No. 10. Washington D.C. U.S. Government Printing Office, 1960
4. Desrosier, N., *The Technology of Food Preservation.* Westport, Conn. Avi Publishing Co., Inc., 1963

SECTION SIXTEEN

Packaging

Packaging aids in lengthening the life of food. It is therefore important to know packaging materials, their characteristics, their weak points and strong points, in order to use them to full advantage.

The groceries are full of well-packaged foods. By scrutinizing them closely, you can learn a great deal about synthetic films, so useful for the homes, so valuable for food preservation. By their properties you shall know them.

POLYETHYLENE — it prevents loss of moisture.

SARAM — it sticks to the surfaces.

PLIOFILM — it allows little loss of gases and vapor from the food.

CRYOVAC — it forms a second skin.

CELLOPHANE — it shows the product.

ALUMINUM FOIL — it gives glitter.

MYLAR — it can carry an elephant.

Helpful hints to the teacher:

1. Ask the students to report on various types of packaging materials as shown in the outline and discuss the packaging requirements of various types of food: frozen, dried, fermented, pickled, etc.
2. Analyze the packaging material used for various classes of food: meat, fish, fruits, vegetables, etc.
3. Ask the students to plan the package for the one product assigned to them in the laboratory giving complete specifications for the package.
4. Prepare a permanent display of tin cans and glass jars of different sizes and shapes.
5. Construct a board showing the manufacture of glass jars and tin cans.
6. Visit a factory making glass jars and/or tin cans.
7. Collect 1 1/2 inch square samples of non-rigid types of packaging materials namely: paper, cloth, and synthetic materials, and their derivatives.
8. Have a large display of rigid and non-rigid packaging materials indicating their properties and their uses.
9. Assign students to answer Questionnaire 12.

LABORATORY PROBLEM 45 Packing Materials

OUTLINE FOR PACKAGING DISCUSSION

1. Basic considerations in selecting packaging material
   a. Aesthetic Aspect
      1. Material
      2. Shape
      3. Size
      4. Color
      5. Design
   b. Practical Aspect
      1. Amount of protection needed
      2. Moisture proofness
      3. Corrosion by acids and alkalies
      4. Strength of container
      5. Odor retention and absorption
      6. Resistance to grease
      7. Resistance to micro-organism
      8. Resistance to light and fire
      9. Effect on nutrients of food
2. Rigid type of packaging materials
   a. Wood
      1. Wooden boxes—give complete protection against compression and breakage.
      2. Wooden barrels — affords greater capacity of storage and is practical for both solids and liquids.
   b. Metal
      1. drums — high resistance to compression
      2. pails — can contain all kinds of materials
      3. tin cans — complete protection against contamination from the outside
   c. Glass container — transparent, therefore has eye appeal
      1. Carboys — its small opening reduces volatilization of substances
      2. Jars — its wide openings allow easier pouring of viscoses foods
      3. Bottles—practical for smaller quantities of volatile products
      4. Drinking-glass type container — reusable as drinking glasses
3. Non-rigid types of packaging materials
   a. Paper
      1. Carton — saves storage when not in use
      2. Glassine and greaseproof paper — versatility and adaptability
   b. Cloth
      1. Textile bags — light, easy to fill and empty
      2. Muslin bag — cheap, satisfactory for thin powders
      3. Cheese cloth — cheap, satisfactory to wear soft foods, which it helps to hold together in a desired shape
      4. Burlap — tensile strength
   c. Synthetic films and derived materials

1. Polyethylene — excellent moisture barrier
2. Cellulose acetate — resistance to dimensional change
3. Polyester film — strongest of all plastic films
4. Saran — sticks to surfaces
5. Vinyl films — produced on a variety of colors and are capable of being printed in multicolor
6. Pliofilm — wide heat — seal range, relatively low water vapor and gas transmission rates
7. Cryovac — heat shrinkable film, shrink equally in all directions when exposed to heat
8. Cellophane — highly transparent
9. Aluminum foil — excellent eye appeal

ACTIVITIES

1. Discuss the packaging requirements of different types and classes of food: frozen foods, dried foods, cured foods, etc.; meats, fish, etc.
2. Plan the packaging specifications for one product that you are especially interested in or has been assigned to you for the semester.
3. Inspect carefully the packaging material used from a preserved food bought at the supermarket.
4. Gather 1 inch square samples of non-rigid types of packaging materials: paper, cloth, synthetic materials and their derivatives.
5. Have for the class a permanent display of different can and glass sizes.

REFERENCES

1. Anonymous, *Food Packaging Materials* (Washington, D.C.: National Research Council, 1958).
2. Anonymous, *Modern Packaging Encyclopedia* (Connecticut: Modern Packaging Corp. and Packaging Catalog Corp., 1950).
3. Barail, L.C., *Packaging Engineering* (New York: Reinhold Publishing Corp., 1954).

SECTION SEVENTEEN

Evaluation of Products

The test of the preserving is in the eating. When tasting products, learn to be discriminating. This is the key to improvement. Evaluate your own products constantly and revise the procedures accordingly. Set your criteria and see how these goals can be met.

LABORATORY PROBLEM 46 Evaluation of Preserved Foods

Evaluation is an important phase in food preparation and preservation. To be really meaningful, one must have the conditions conducive to proper evaluation. Here are some suggestions on evaluating individual products.

A. Time — *A hurried scoring is not recommended.*

Evaluation is best done several times during the semester. All products under the same method of preservation is evaluated each time. Storage time of at least three weeks is done before evaluating the products.

The last hour of the laboratory period is set aside for evaluation. At each session, the group is given 10 minutes to prepare their products to be evaluated and to distribute to the rest of the groups. Each group in turn is given 15 minutes to evaluate the products. The product leaders are then given 5 minutes to summarize group evaluation ready for class discussion.

B. Set-up

1. Prepare the products for evaluation.
2. Distribute the products in identical containers for group evaluation with proper identification and leave one portion for class discussion.
3. Place a fork or spoon beside each product to be used only for transferring samples to the plate for scoring. Do not use your own fork for getting samples of the product on the tables.

C. Evaluation Sheet

1. Prepare evaluation sheets for judging the product. The characteristics of the products are listed under three headings, exterior, interior, and palatability. First examine the exterior, then the interior, and finally taste the product.

   Note: To save time and facilitate interpretation and analysis, each product leader should provide the groups ready-to-use evaluation sheets.

D. Discussion

The group gets together to discuss the characteristics of the product and the modifications necessary in the procedure. One member summarizes the findings and submits the summarized group report to the product leader.

E. Class Evaluation

The last 30 minutes of the evaluation period is alloted for class evaluation.

The group leader reports the results of the group evaluation to the class. Further discussion on the product as to the problems, modifications, and recommendations are supplemented by the teacher.

LABORATORY PROBLEM 47 Planning Use of Preserved Foods

Meal planning is an art that is doubly rewarding in terms of satisfaction and nutrition. The preserved goods should fit into the menu.

Several rules have been set on meal planning namely:

1. Meals should meet nutritional needs.
2. Meals should fit the food budget.
3. Meals must please and satisfy.
4. Meals should make reasonable demands on the homemaker's time and energy.

Note to the teacher:

Two laboratory periods for evaluation may be set aside each semester. The first set of products to be evaluated is the frozen, the salted, the cured, the dried, the smoked, and the fermented products; the second is the canned and chemically preserved products.

ACTIVITY

1. *Plan* a meal using the foods you preserved. Check against the criteria for a good meal.
2. *Serve* a meal using canned foods and ask the guests to evaluate the whole meal and the individual dishes.
3. *Discuss* the convenience of preparing meals from frozen and/or canned foods.

REFERENCES

1. Kinder, F. *Meal Management* (N.Y. The MacMillan Company, 1956.)
2. Standard books.

SECTION EIGHTEEN

Continuing Education in Food Preservation

Education is a continuous process and food preservation a continuous challenge. There will always be fun and deep joy for those who preserve foods.

LABORATORY PROBLEM 48 Field Trips

A picture, they say, is worth a thousand words. In like manner, a field trip may save many hours of reading and explaining. It is fascinating to know how informative one trip to a market or a grocery store could be. Then, too, there are the various commercial establishments that do food preservation in large scale. Whereas you have worked with pounds of fruits or kilos of meat they are working with tons and tons of them; and successfully too!

To make the trip truly meaningful, it might be worth knowing all you can about the product before you actually visit. Newspaper articles on the company and basic information on the product and methods of preservation employed will aid much in helping you ask pertinent questions.

It is worthwhile to take down notes during the trip itself. This will make the task of writing a field trip report less of a drudgery. Notes will also help make the significant facts easier to remember.

Outside of the trips planned for the class, it is good to visit places you are especially interested in. This may be a sausage stall in a public market in your vicinity or a small factory in the province where you spend your vacations. There is no end to the ways food preservation principles are applied, so keep your eyes and ears open.

Below is a list of places to visit in the vicinity of greater Manila

1. Refrigeration and Freezing

   La Insular Ice Plant
   Plaza Lawton, Manila

   Magnolia Dairy Products
   660 Echague, Manila

   Far East Commodities Corporation
   110 Tagaytay St. Caloocan City

2. Dehydration
   Araneta University
   Victoneta Park, Caloocan City

3. Pickling and Fermentation of Fruits and Vegetable Products
   Ram's Food Products
   Biñan, Laguna

   Silver Swan Manufacturing Company, Inc.
   209 A. del Mundo, Caloocan City

Hoc Guan Co., Inc.
Tinejeros, Malabon, Rizal

San Miguel Brewery
Polo, Bulacan

4. Curing of Fish and Meat Products
   Rufina Patis
   19 Pescador, Manila

   Ackermann's Sausage Factory
   1474 General Luna, Manila

   Pure Foods Corporation
   Union and Pines, Mandaluyong, Rizal

   Delta Manufacturing Company
   Far East Building, Buendia, Corner Pasong Tamo, Makati, Rizal

   U.P. Pilot Food Plant
   Diliman, Rizal

5. Sugar Concentration
   California Manufacturing Co., Makati, Rizal

6. Canning
   Genato Commercial Corp.
   1134 R. Hidalgo, Manila

   Gina Food Products
   804 Globo de Oro, Quiapo, Manila

   Rosepacking Company, Inc.
   2961 Apelo Cruz, Pasay City

7. Packaging
   San Miguel Glass Factory
   Muelle de la Industria
   Tondo, Manila

   Reynolds Philippine Corporation
   E. de los Santos Avenue, Mandaluyong, Rizal

   Plastics Inc.
   75 España Extension, Quezon City

LABORATORY PROBLEM 49 Advances in Food Preservation

Research they say, is a friendly, welcoming attitude towards change. It is good to keep on reading then.

Table 20. Indices, Abstracts and Journals on Food Preservation and Allied Fields

1. Food Engineering
2. Food Manufacture
3. Food Technology
4. Journal of Food Science
5. Journal of Home Economics
6. Journal of Nutrition
7. Journal of Agriculture and Food Chemistry
8. Journal of American Public Health Association
9. Canner-Packer
10. Journal of Bacteriology
11. Journal of Industrial Engineering and Chemistry
12. Science
13. Annual Review of Biochemistry
14. Annual Survey of American Chemistry
15. Nutrition Abstracts and Reviews

16. Nutrition News
17. Nutrition Reviews
18. Physiological Reviews
19. Science Review
20. Biological Abstracts
21. Chemical Abstracts
22. Commercial Fisheries Abstracts
23. Nutrition Abstracts and Reviews
24. Philippine Abstracts
25. Refrigeration Abstracts

ACTIVITIES

1. *Abstract* the recent advances in one method of preservation
2. *Report* to the class an article on a novel way of preserving one kind of food.
3. *Read* on the progress in the preservation of the type of food.
4. *Clip* newspaper article on the latest advances in food preservation.

LABORATORY PROBLEM 50 Recipe Standardization

In order to try your hand at improving recipes, here are a few hints for recipe standardization:

1. Have a tentative recipe for the product.
2. Use the same amount of raw material each time.
3. Order the same variety, size, maturity of fruits and the same cuts of meat.
4. Follow your preliminary recipe carefully.
5. Note the character of the product in process and the finished product.
6. Note the length of time of preparation.
7. Make the necessary corrections of your tentative recipe based on known principles of food preservation.
8. Try the procedure, exercising care in the choice of material and procedure.
9. Evaluate the product.
10. Continue improving as called for.

APPENDIX

A. *LECTURE OUTLINE*

FOOD PRESERVATION. Fundamental physical and chemical principles governing food preservation by drying, salting, fermenting, concentrating, canning, and freezing.

Credit: 3 units (2 hours lecture, 1 1/2 hours laboratory)

Time table

1*st week*	Objectives of the course. Organization and evaluation. History of food preservation.
2*nd week*	Introduction to food preservation methods The spoilage agents: biological, chemical and physical.
3*rd week*	Asepsis Additives: salt or sugar or both, spices, acids (vinegar, sour milk, etc.)
4*th week*	Additives: smoking Additives: antibiotics
5*th week*	Removal of moisture or osmotic pressure: drying Removal of moisture or osmotic pressure: dehydration
6*th week*	Removal of moisture or osmotic pressure: jellies and jams
7*th week*	Fermentation in salty foods; *sauerkraut*, pickled meat and fish products, fermented milks Fermentation in sugar foods: wine, vinegar, *nata*
8*th week*	Low temperatures refrigeration; Low temperatures: slow and quick freezing
9*th week*	High temperatures: Pasteurization of acetic acid preserves High temperature: pasteurization of fruit juices
10*th week*	High temperatures: boiling High temperature: canning; brief history and principles of canning
11*th week*	General steps in canning Classification of foods for canning
12*th week*	Factors affecting processing: heat resistance of microorganisms Factors effecting processing: heat penetration
13*th week*	Canning of high-acid foods. Use of an open water bath processor

14th week Canning of low-acid foods
Use of the pressure canner for sterilizing canned foods

15th week Packing materials: plastic materials
Fungicides (yeast and mold inhibitors): sodium benzoate and sorbic acid

16th week Other methods of food preservation, filtration, pressure, gases (CO_2 and O_3 ethylene oxide)
Recent advances in food preservation: irradiation and aseptic canning

The references are listed at the end of each section.

B. SUGGESTED LABORATORY RULES

1. Students are required to wear a plain uniform prescribed by the teacher, a hairnet, and a pair of comfortable low-heeled shoes during laboratory period. Students are discouraged from using a smock or loose gowns over their street clothes.
2. There are two types of towels to be used during the laboratory preparation — blue towel for wiping working areas, stoves, ranges, and tables; striped checkered towels for dishes, silverware, and clean cooking utensils.
3. Working units must be kept clean and dry after each laboratory preparation. Cooking utensils, after having been washed, must be drained and wiped and returned to their proper places.
4. Cooking utensils not available in each unit are to be signed out from the storeroom and returned to the laboratory assistant.
5. Students must check and turn off electric and gas range after the laboratory.
6. Chairs must be pushed back to their places or folded in a corner after each laboratory period.
7. Electric fans and lights must be put off after use.
8. Students who desire to use the laboratory outside of class hours must secure the permission of the laboratory assistant.
9. Students are required to observe proper class behavior and refrain from making any unnecessary noise or from talking in a loud voice in the laboratory.
10. Students are urged to use or share lockers provided for them in the ladies' room for their books, purses, bags, and other personal belongings.

C. LIST OF EQUIVALENTS

1 gallon = 8.33 pounds
1 gallon = 4 quarts
1 gallon = 8 pints
1 quart = 946.4 milliliters
1 cup = 8 ounces
1 ounce = 29.6 milliliters
1 ounce = 2 tablespoons
1 tablespoon = 3 teaspoons
= 1/2 fl. ounce
1 teaspoon = 4.9 milliliters
1 liter water = 0.26 gallons
= 1.06 quarts
1 gallon = 3.79 liters
1 kilogram = 2.2 pounds
1 pint = 2 cups
1 pint = 16 ounces
1 cup = 236.5 milliliters
= 16 tablespoons
1 pound = 453.6 grams
1 pound = 16 ounces
1 ounce = 28.35 grams
1 gram = 15.43 grains
= 0.035 ounce
1 cup = 200 grams sugar
1 cup = 288 grams salt
1 milligram/kilogram = 1 part per million

D. A DICTIONARY OF PRESERVING TERMS

ABDO — bile, not edible.

ACHUETE — red anatto seeds used for food coloring.

ADOBO — pork, poultry or fish viand simmered until tender in vinegar, garlic, and fat, and finally allowed to brown in its own fat.

ADOBADO — similar to adobo in ingredients, but differs from the latter in that the meat and garlic are allowed to brown and then some broth and vinegar are added. It has little sauce.

ALMONDIGAS — pork balls.

ANGKAK — red colored grains of rice used as coloring for fermented fish.

ANISADO — anise wine.

APOG — lime, the oxide of calcium.

APULID — water chestnut.

ARROZ CALDO — usually a rice gruel cooked with chicken or sometimes with the internal organs of the cow as uterus (*bahay guya*), tripe or stomach.

ARTERY PUMPING — injecting curing mixture in the artery behind the leaf fat and in backbone and ribs of ham to insure fast, safe curing of ham.

ASADO DE CARAJAY — pan broiled.

ATAY — liver.

BATCHOY — a pork dish made up mainly of chopped variety meats, kidney, liver, heart, and loin of the pigs cut into small pieces and fried until brown. Garlic, onion, and ginger are sauted and then stock is added. This mixture and the meat are boiled until the meat is tender.

BAGOONG — fermented small fishes or shrimps may be made of *dilis* (Stolephorus Commersoni), *alamang* (small shrimps) and *itlog* (eggs of either *banak* (Family rugilidae), *dalag* (Ophicephalus striatus), *bito* (Clarias batrichus) or *carpa.*)

BAHAY GUYA — Tagalog term for uterus.

BATO — kidney.

BOPIZ — a dish from pork variety meats, garlic, onion, and tomatoes. These are sauted and to this mixture is added chopped pig's lungs, liver, and heart. Water is added and the mixture boiled until done.

CASUBJA — saffron.

COVER PICKLE CURING — submerging meat in pickling mixture.

DILAO — turmeric.

DRY RUBBING — spreading curing mixture on surface of the meat.

DUGO — blood.

EMBOTIDO — ground beef or pork meat roll wrapped with cheese cloth and cooked.

EMPANADITA — ground meat mixture wrapped in pastry and deep-fat-fried.

EMPELLA — omentum.

ESTOFADO — also known as *humba* Deep-fat fried pieces of pork (3" × 3" in size) are cooked in vinegar, salt, sugar, water and spices until tender. Fried bread, fried potatoes and fried *saba* are added when meat is tender.

ESTO SINASAL — leaf fat, used to wrap meat mixtures as *morcon* and *jocho dulce*

GALLANTINA — stuffed chicken wrapped with cheesecloth and allowed to tenderize in simmering water.

GARBANZOS — Spanish chickpeas.

HUMBA — Tagalog term for *estofado.*

INIHAW — pork or fish roasted whole or as pieces over live embers or under range boiler.

KILAWIN — (See *Quilawin.*)

KINUNOT — a Bicol pork dish cooked with chopped santol, *bagoong,* hot pepper (*siling labuyo*) and coconut milk.

KULAOC — Pangasinan equivalent for Quilawin.

LAKSA — Tagalog term for ten thousand, refers to dish containing assorted vegetables, shrimps, pork, and *sotanghon.*

LALAOGAN — esophagus

LAPAY — pancreas.

LAUREL — bay leaf.

LECHON — pig sucklings, strung on long bamboo poles usually roasted over live embers.

LIGIA — wood ash lye.

LUMPIA — a mixture wrapped in thin wrappers made up of flour and water. The mixture is any meat, fish or vegetable combination. Sometimes bamboo shoots, green grated papaya, or the heart of the coconut trunks (*ubod*) are used. Lumpia may be served fresh with a sauce.

MAMI — a popular Chinese dish made up of miki, shredded pork, and chicken meat and garnished with celery leaves.

MENUDO — diced liver and pork cooked with garlic, onion, tomatoes, potatoes, and garbanzos.

MIKI — wheat noodles with eggs.

MISU — paste made of fermented rice and soy beans.

MISUA — fine wheat noodles.

MOLO — meat mixture of ground pork with shrimps or chicken wrapped in bread flour dough. The wrapped meat balls are then boiled in chicken stock previously sauted with garlic and onions.

MORCON — similar to *embutido* except the meat mixture is wrapped not in cheesecloth but in 1/4 inch thick slices of beef.

OREGANO — Mexican sage.

PAKSIW or PAKSIAO — native term for pickling fish or meat. *Paksiw na lechon* is very common.

PANTOG — urinary bladder, not edible.

PATA — feet.

PIMENTON — paprika

PATIS — fermented fish hydrolyzate.

PINACBET — Ilocano dish prepared by boiling vegetables with plenty of tomatoes and *bagoong* juice; may have pork, shrimps or *sitsaron* added.

PINANQUE — (See Bopiz.)

PUSO — heart.

RELLENO — stuffed chicken or fish.

SALITRE — Saltpeter, niter, nitrate of potassium (KNO_3).

SILING LABUYO — small hot red pepper, *capricum frutescens*.

SINIGANG — meat or fish dish simmered with sour fruit, tomatoes, toes, vegetables, and rice water.

SITSARON — pork cracklings.

SOTANGHON — noodle made out of rice or rice and mongo.

SPRAY PUMPING — pumping of pickling mixture along the bones, around the joints and vertically in the thicker, lean portions of hams or shoulder.

TAPA — cured and dried pork or beef.

TAUSI — fermented soy beans.

TASTASIN — omentum, a fold or duplication of the peritoneum passing between certain of the viscera.

TAWAS — alum, an astringent crystalline substance, a double sulfate of aluminum and potassium.

TOYO — soy sauce.

TREPILLA — Tagalog term which may apply to small intestines or uterus.

Name ______________________ *Rating for Questionnaire* 1 __________

Class Section ______________________ *Date Due* __________ *Submitted* ______

SECTION II. SPOILAGE AGENTS

LABORATORY PROBLEM 6. CHARACTERISTICS OF SPOILAGE AGENTS

1. Fill up the following table

	MOLDS	YEASTS	BACTERIA
a. Definition			
b. Description			
c. Examples of species commonly found in food			
d. Moisture requirement			
e. Optimum temperature			

f. Heat resistance

g. Oxygen requirement

h. Optimum pH

i. Examples of beneficial effects

j. Examples of harmful effects

2. Fill up the following table on enzymes:

	Oxidative	Hydrolytic Enzymes
a. Definition		
b. Description		
c. Examples		
d. Conditions that favor their action in foods		
e. Methods of preventing enzyme action		

Name ______________________ *Rating for Questionnaire 2* ________

Class Section ______________________ *Date due* _______ *Submitted* _______

SECTION II. SPOILAGE AGENTS

LABORATORY PROBLEM 7. CONDITIONS THAT FAVOR THE GROWTH OF STORAGE AGENTS

Observe the results of the experiment on yeast in the glass.

1. Effect of temperature on the growth of yeast
   a. frozen (32°F)
   b. boiled (212°F)
   c. room temperature (F)
   d. chilled (F)

Explain results

2. Effect of food conditions on the growth of yeasts
   a. water
   b. flour and water
   c. milk
   d. flour and milk
   e. diluted potato water
   f. starch and water
   g. water and sugar
   h. water and cooking oil

Explain results

3. Effect of moisture on the growth of yeasts

	Initial volume	Increase in Volume		
		30 min	60 min	90 min
A. Soft Dough				
1.				
2.				
B. Stiff Dough				
1.				
2.				

Explain results

4. What are the conditions of yeast growth on foods?

5. What are the effective methods of preventing spoilage of foods by yeast?

Name ______________________ *Rating for Questionnaire 3* ________

Class Section ________________ *Date due* ________ *Submitted* ________

Section III. Proper Storage

Laboratory Problem 8 Storing Foods

I. With the aid of table 6, observe the signs of spoilage of various food items stored under different methods.

Food	Signs of Spoilage	Possible Causes of Spoilage	Methods of Preventing Food Spoilage
1. Room Temperature			
a. baking powder			
b. flour			
c. onion			
d. others specify			
2. Refrigèrator temperature			
a. meat			
b. fruit			
c. vegetables			
d. others specify			
3. Canned Food			
a. meat			
b. fruit			
c. vegetables			
d. others specify			

FOOD	SIGNS OF SPOILAGE	POSSIBLE CAUSES OF SPOILAGE	METHODS OF PREVENTING FOOD SPOILAGE
4. From the market			
a. meat			
b. fruit			
c. vegetables			
d. others, specify			

II. a. List the temperature and relative humidity as reported in the newspaper for one week.

DAY	DATE	TEMPERATURE	RELATIVE HUMIDITY
MON			
TUES			
WED			
THURS			
FRI			
SAT			
SUN			

b. How does humidity affect the deterioration of food?

III. Illustrate a cooling set-up applicable to homes without refrigerators. Label diagram properly.

Name ______________ *Rating for Questionnaire* 4 ______

Class Section ______________ *Date due* ______ *Submitted* ______

SECTION VI. SALTING, DRYING, AND SMOKING

1. Describe the different methods of obtaining salt in the Philippines.

2. Evaluate Manila solar salt as a preservative for fish and meat.

3. How does salt penetrate into food? How do chemical impurities affect efficient preservation of salting?

Name ______________________ *Rating for Questionnaire 5* ________

Class Section ______________________ *Date due* ________ *Submitted* ________

SECTION VII. CURING OF MEAT AND FISH

1. Diagram the mechanism of changes in color of cured meats.

2. What are the common defects in cured meats?

3. What are the common errors in the curing of fish?
   How can these be prevented?

Name ____________________ *Rating for Questionnaire 6* __________

Class Section ____________________ *Date due* ________ *Submitted* ________

SECTION VIII. FERMENTATION, PICKLING OF FRUITS AND VEGETABLES

1. Note down the sugar content of 12 common local vegetables that are commonly pickled.

a.
b.
c.
d.
e.
f.
g.
h.
i.
j.
k.
l.

2. Enumerate the factors which affect the rate of lactic and acetic acid formation.

3. Name the organisms that are responsible for lactic and acetic fermentation. Where are they found?

Name ____________________ *Rating for Questionnaire 7* ________

Class Section ____________________ *Date due* ________ *Submitted* ________

SECTION IX. FERMENTATION OF FRUITS IN SIRUPY MEDIUM

1. Report the sugar content of the food that are generally fermented to produce wines, vinegar, and *nata.*

   a.
   b.
   c.
   d.
   e.
   f.
   g.
   h.
   i.
   j.
   k.
   l.

2. Name the conditions that favor the growth of fermentation organisms in sirupy medium.

   a.

   b.

   c.

3. Discuss the local method of preparing vinegar from fruits.

4. Enumerate the common causes of failure in vinegar making.

5. Describe how some of the local wines are prepared.

a. *basi*

b. *tuba*

References:

Name ______________________ *Rating for Questionnaire* 7 ________

Class Section ______________________ *Date due* ________ *Submitted* ________

Section X. Sugar Concentrates

1. Characterize pectin.

2. List the Philippine fruits rich in pectin.

a.
b.
c
d.
e.
f.

Philippine fruits rich in acid

a.
b.
c.
d.
e.
f.

3. What is Goldwaithe's definition of a good jelly?

4. What are the common causes of failures in jelly? Give at least two. How can these be prevented?

5. What are the common causes of failure in jam? Name two. How can these be avoided?

6. What are the defects in paste candies? Give two. How can these be avoided?

7. What are the common faults in fruit preserves? Name two most common ones. How can these be avoided?

8. What are the common defects of crystallized and glazed fruits? Name two. What can be done to avoid these errors?

Name ______________________ *Rating for Questionnaire 9* __________

Class Section ______________________ *Date due* ________ *Submitted* ________

SECTION XIII. CANNING OF FRUITS AND VEGETABLES

1. What are the essential factors of the sanitary tin can?

2. Enumerate the factors which affect the following:

   a. heat resistance of micro-organisms.

   b. heat penetration

3. What are the types of lacquers commonly used for canning of fruits and vegetables? What is the principle behind their use?

Name ______________________ *Rating for Questionnaire* 10 __________

Class Section ______________________ *Date due* ________ *Submitted* ________

SECTION XIV. CANNING OF MEATS AND FISH

1. Fill up the following table on food poisoning.

	Type	Symptom	Causes	Method of Prevention
a.				
b.				
c.				
d.				

2. Discuss the stability of vitamins and pigments commonly found in foods to the canning procedure.

Name ____________________ *Rating for Questionnaire* 11 ____________

Class Section _______________ *Date due* _______ *Date submitted* _______

SECTION XV. PRESERVATIVES

Name of Preservative	Uses	Permitted Levels
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

Name ______________ *Rating for Questionnaire* 12 ______

Class Section ______________ *Date due* ________ *Date submitted* ________

SECTION XVI. PACKAGING

Packaging Material		Properties	Uses
1.	sample		
2.	sample		
3.	sample		
4.	sample		
5.	sample		

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Mrs. de Leon has several studies on Food Technology published in the *Philippine Journal of Home Economics* and the *Journal of Food Science*.

She supervised the U.P. Pilot Food Plant in the summer of 1962, and was adviser of the Home Economics Association, U.P. College of Home Economics from 1962 to 1964.

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